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THE

DENTAL COSMOS:

A

MONTHLY RECORD OF DENTAL SCIENCE.

Devoted to the Interests of the Profession.

EDITED BY

EDWARD C. KIRK, D.D.S.

Observe, Compare, Reflect, Record.

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THE

DENTAL COSMOS.

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ORIGINAL COMMUNICATIONS.

OBSERVATION OF THE RELATION OF THERMAL IRRITATION OF THE TEETH TO THEIR TREATMENT.

BY LOUIS JACK, D.D.S., PHILADELPHIA, PA.

(Read before the Pennsylvania State Dental Society, July 13, 1898.)

THE purpose of this paper is to make it appear that in several disorders of the teeth one of the pathological factors is the increased impatience to thermal irritation which they exhibit, and that by careful observation of the effects of fluctuations of temperature in either direction we may be guided in the treatment and may be able to form a favorable or an unfavorable prognosis of any given case.

In various papers upon the conservative treatment of the dental pulp I have called attention to the importance of considering the sensitiveness of this organ to thermal impressions. I did not then know the value of more careful observation of the degrees of heat in either direction, or how considerable is the variation of irritated pulps with different persons; neither had I acquired definite knowledge of the variation in the rate of temperature, both high and low, which is disagreeable to the healthy teeth of different persons.

The teeth, like the other tissues of the body, are subject to irritation on subjection to heat above the normal maximum point of tolerance and by reduction of temperature below the normal minimum rate of tolerance.

The surface of the body gives impression of pain when the temperature is raised to the neighborhood of 130° F., and is irritated by the continued application of a temperature of 40° to 45°. These rates apply almost equally well to the mucous membrane of the mouth as to the exposed skin. These temperature rates are nearly uniform, except as habit and the influence of vital force may modify the impression.

In addition to the presence of the pulp the ultimate distribution of the terminal branches of the canaliculi forms a plexus, the *stratum granulosum,* which appears to be the anatomical element of the tooth which most immediately takes cognizance of thermal extremes, and which on the occurrence of irritation of the pulp manifests increased impatience of the disordered tooth upon the application of reduced or of elevated temperatures. The shock of a cold application is more quickly noticed than would be the case if the reaction were from the pulp, as the substances of the tooth are poor conductors of heat.

The degree of heat not unpleasant to the healthy teeth may be designated as the normal rate of the individual. This varies with different persons to a considerable degree, as heretofore stated; while some will endure without irritation a stream of water at 135° applied to an isolated healthy tooth, others are unpleasantly affected by a temperature of 120°.

The effects of cold temperatures excite impatience when applied to healthy teeth to a greater degree relatively to the mucous membrane than they are affected by heat; that is, they much better tolerate 130° than they bear 40°. In this connection it is significant that the earliest manifestation of irritation of the dental pulp is intolerance of cold temperatures, and that it is an invariable indication of excitation of the nerves of the pulp as the consequence of commencing hyperemia.

As to the normal cold rate, some persons tolerate without impatience the continued application of a stream of water at 40°, and in some instances I have found vital teeth so unimpressionable that the vapor of ethyl-chlorid would not cause pain. Others have pain at 70°, and I have found a case where the normal cold rate was 78°.

These are extreme examples, but the normal rate is so various from the tests I have made as to require in the treatment of disturbed pulps the ascertainment of this rate of the sound teeth. For this purpose I usually select the lower incisors, or any tooth of which the dentin or cementum is not exposed.

To ascertain the normal rate it is generally required to isolate the tooth with rubber-dam. With reference to treatment, the normal becomes a control rate; the lower rate I designate by the — symbol, and the higher by the + symbol.

The following table shows several variations by actual tests. Some of these cases will be alluded to to illustrate the clause considering treatment.

	Below 100°.	Above 100°.	Range of tolerance.
1. Mr. D. P., — 58 + 134	42	34	76
2. Mrs. W. H. J., — 55 + 130	45	30	75
3. Miss T., — 63 + 131	37	31	68
4. Mr. E. C., — 71 + 120	29	20	49
5. Miss I. M., — 76 + 124	24	24	48
6. Mrs. M., — 78 + 000	22	30	52

It easily appears significant from these data as a guide in the treatment that when we compare a control rate of — 58 + 134 with the control rate of — 71 + 120, how important the ascertainment of this basis is in each case presented. As the aim in each instance must be to reduce the ascertained rate of the disturbed pulp to an approximation with the control rate, it is evident that more care is required, and the prognosis is less certain in the latter than in the former example, since the latter indicates a greater degree of constitutional tendency to thermal reaction. More caution is necessary in such conditions to protect the case during the treatment from exposure to shocks in either direction, and the treatment must be more assiduous.

Furthermore, the determination of the control rate appears valuable in the treatment of ordinary cavities when the pulp is not nearly reached, since if the range of tolerance is small there is greater liability to hyperemia following metal fillings than is the case where the range of tolerance is large.

The phenomenon of sensitivity of dentin as the consequence of the chemical irritation of the exciting causes of caries upon the protoplasmic elements of the dentin must inevitably induce slight hyperemia of the pulp. This is indicated by the changes which take place in the canaliculi contiguous to the carious part, as well as by the deposition of tissue in the pulp-chamber opposite to the carious cavity. It has not yet been determined whether this slight hyperemia increases the reaction of the teeth to thermal impressions. I have not been allowed to make the necessary observations to form a conclusion. In one case, where the open and cleansed cavity gave reaction at — 60° + 110°, when it was filled with a non-conductor the reaction of the tooth was at — 80° + 130°. In such tests there exists the liability to error, since the temperature tests extend their influence to the area surrounding the margins of the cavity, which cannot be eliminated from the evidences of pulp-irritation.

The difficulty is enhanced when, as frequently is the case, the surface of the cavity will not tolerate a temperature in either direction of 3° from the blood rate. A pulp which would be impatient of variation from the blood heat of so slight a difference would be in a very serious condition. It is evident where a carious cavity presents so great reaction as this there is danger of irritation of the pulp. It hence follows that where there is a small thermal tolerance it is plainly indicated that great care be used to protect by lining the pulp-wall with some means to reduce conduction.

More significance is to be attached to a high minus rate than to a low plus rate, for the reason that the danger of exposure to low temperatures is greater than is the liability of the teeth being subjected to heat, since food and fluids are not often taken at temperatures above 120°, whilst it is difficult to protect from temperatures below 70°.

It is for this reason that when pulps are exposed or are hyperemic from any cause, the patient does not complain of heat until the disturbance has dangerously developed. On this account also, unless the adviser makes careful tests, he remains ignorant of the possible intolerance to heat. In each case of pulp-disturbance it will be found, in addition to marked impatience to abstraction of heat from the tooth, there is intolerance of heat at some point below the control rate.

The determination of the control rate and the temperature rate of a disturbed tooth, while very simple of application, requires care to secure reliability and to exclude errors. Two vessels, one containing cold water, the other hot, or two water taps, are necessary. By graduating some of the cold by the hot to about 70° F.,—the tooth being isolated, and the cavity closed with cotton or any non-conductor,—a stream from a syringe is thrown upon the enamel for a few seconds, the nozzle being held near the tooth to prevent loss of heat of the water in passing through the air.

The temperature may then be successively lowered to the degree where reduction of the heat of the tooth induces some discomfort. This is the minus rate. Then by increasing the heat of the water gradually the plus rate is ascertained. In this connection some persons are susceptible to differences of sensation of less than 2°. Where the normal control rate is known and the disturbed rate, the treatment may be conducted.

The best syringe I know of for the purpose is the Laskey, when it is well made. This syringe facilitates the tests, as the water enters it at a large opening and is discharged through a small aperture.

Hyperemia and inflammation of the pulps of teeth are induced by a variety of causes.

(a) These are exposures or approximate exposures of the pulp; *(b)* the conditions which follow the conservative treatment of the pulp; *(c)* secondary sensitivity of the teeth where the proper precautions have not been taken to prevent this occurrence; *(d)* the filling of teeth with thermal conductors where the pulp approximates the cavity; *(e)* severe mechanical shocks; *(f)* pericemental inflammation when this condition approaches the apices of the roots.

The general cases requiring treatment are *a* and *b*. What I have to further consider is particularly applicable to these classes.

The first requirement is to protect the organ so far as possible from temperatures beyond the range in either direction of the limits of toleration. Secondly, to make continued application of aconitum until the symptomatology indicates either a progress toward recovery, or in the direction of severe inflammation or necrosis of the pulp.

Aconite, so far as I am aware, combined with a slight degree of counter-irritation, is the only therapeutic means which we have to effect control of the pulp when it is desirable to make a profound impression upon it, and where the conditions are such as to lead to the probability of its recovery. In my experience topical applications directly to the pulp are of little value toward its restoration after it becomes actually exposed.

If salvable, I find it is safer to proceed to give an immediate protective capping and a non-conductive stopping.

The applicability of aconite consists in its property of depression of the sensory nerves, and that when locally applied it is a powerful paralyzant to the sensory nerves and acts more particularly upon their peripheral endings.

It has been claimed that aconitum has an influence over the capillary circulation, but this has not been established. If it be so, the action is probably to be found in its primary influence over the sensory nerve terminals.

The application of aconitum in the mouth requires care to avoid its distribution beyond the local region to be brought under its influence. To effect this, and at the same time to produce some counter-irritation, I combine the tincture with chloroform, equal parts. A pledget of cotton to cover an area about the size of the first phalanx of the index finger is saturated with the formula, and then squeezed between layers of muslin or absorbent paper until it is comparatively dry. This is to prevent any escape of the medicament into the mouth, to which it is irritating, or to the throat, where it is extremely distressing. It is then placed upon the gum over the affected tooth, and retained there for twelve to fifteen seconds. It is of the greatest importance to first rub from the gum the coating of mucus, which would otherwise interpose against the absorption of the aconite. It is also better that at the moment of application the surface be dry. I am thus minute in these directions, for in the carefulness of the treatment much of the result depends.

In marked cases the applications should be made on alternate days, or even each day during aggravation. In the latter it should be applied on the buccal side one day, and the next day upon the lingual aspect. As amelioration takes place, the periods between the applications are lengthened.

In the cases where treatment is given at the outset of the occurrence of disturbance, one or two applications are often sufficient. In neglected cases many may be required.

In all instances the temperature tests are the guiding factor, and go along with the other attention the case may receive.

In the text-book on operative dentistry of Dr. Kirk, I have carefully defined the limits wherein there is prospect of safe conservative treatment of disturbed pulps, and have pursued this line of treatment within the limits therein defined, and regard the results to be as satisfactory as attend the treatment of other amenable diseases of the teeth.

It may be of interest to illustrate the above outline of treatment by a citation of some cases.

No. 1 is the case placed first in the table given above.

First left lower molar pulp exposed and capped April 10, 1894. Control rate — 58° + 134°. After a disturbance continuing several days the patient applied for treatment April 18, 1898: temperature rate 74° + 116°. April 19, rate — 71°. 21st, + 120°. 24th, — 73° + 120°. 27th, — 69° + 127°. Returned May 16, — 60° + 134°. Discharged.

No. 2. Left lower molar pulp fully exposed and capped on distal surface February 5, 1873 (twenty-five years). Mesial surface also similarly treated May 12, 1891 (six and one-half years). On November 16, 1897, appeared with pulp-disturbance. It was found that the temporary filling of the mesial aspect had lost a portion, exposing the edge of the cap. Some infection had probably taken place; recapped it and commenced the treatment outlined above. Control rate, — 55° + 130°. Temperature rate of tooth, — 73° + 108°; 16th, — 76° + 112°; 18th, + 118°; 19th, — 74° + 120°; 20th, — 74° + 124°; 27th, — 67° + 128°; 29th, — 66° + 130°. Discharged. At a subsequent interview there was quiescence.

To show that bad cases may be improved, a serious one presented where the patient objected to devitalization. No control rate taken:

Lower bicuspid. April 22, 1898, — 73° + 100°; 23d, — 75° + 106°; 25th, — 72° + 108°; 27th, — 72° + 108°. Returned from a journey June 24, — 76 + 120°. Tooth was then quiescent.

No. 5 in table. Control, — 76° + 124°. Upper molar. For several weeks there had been some reaction to cold and reflected pain, with a temperature rate — 85° + 108°, which became, under treatment — 80° + 120°, which was as near the control rate as could be attained. Here was a commencing range of tolerance of only 23°, which was increased to 40°, this being within 8° of the ordinary tolerance of her sound teeth. The pulp remains alive.

It will be observed generally, as in the above-cited cases, when the plus rate commences to rise the impatience to cold somewhat increases.

In No. 4 of table, where the control rate is — 71° + 120°, I have capped three pulps which have succumbed. This also occurred with No. 6. As in the latter, I capped two pulps, since devitalized. This would indicate that when the range of tolerance is as small as 50° it is questionable whether conservative treatment of the pulp offers any chance of satisfactory results.

A summary of the course of disordered pulps may be considered as follows:

The diagnostic peculiarity of a disturbed pulp is impatience of temperature beyond, in either direction, the control rate of the healthy teeth.

Hyperemia of the pulp is indicated by decided pain being caused by the abstraction of heat, along with reflected pain, mostly in the ear.

Continued hyperemia and inflammation of the pulp is indicated by the effects of the application of ten to twenty degrees of heat below the control rate.

In hyperemia of the pulp there is usually some amelioration by gentle heat, even when the teeth may be pained by an additional acceleration of heat.

Inflammation, or long-continued hyperemia, is temporarily relieved in the same manner by moderate cold, to a certain point in the course of the disturbance, where response to cold ceases and when heat occasions the most unbearable pain.

That at this point the pulp is soon necrotic by the establishment of a static condition of its circulation.

A FEW CONSIDERATIONS IN FILLING TEETH.

BY C. N. JOHNSON, L.D.S., D.D.S., CHICAGO, ILL.

(Continued from page 995, vol. xl.)

BUCCAL, LABIAL, OR LINGUAL CAVITIES.

ALL cavities occurring on either of the three surfaces—buccal, labial, or lingual—call for similar treatment so far as the principles of cavity formation are concerned, except the small rounded cavities having their origin in the pits on the buccal surfaces of lower molars and the lingual surfaces of the upper anterior teeth. These pitted cavities are quite distinct in character and environment from the ordinary buccal and lingual decay occurring near the gum-margin, and their preparation is so self-evident as not to call for any extended or detailed description. The fact that they are usually the result of structural imperfections in the tooth at the point of decay, and that they occur on surfaces which are ordinarily readily cleansed by friction, renders it necessary only to remove the carious and imperfect tissue, secure good margins, and give a mortised form to the cavity. No extension for prevention is required in these cases.

But where decay occurs near the gum-margin and extends in a crescent form, following the outline of the gum along the surface of the tooth, the problem of its control becomes more complicated. These are sometimes accounted the most difficult of all cavities to deal with, and yet if properly managed they will respond to treatment with most gratifying results. The plans for keeping the cavity dry during the operation, which to many seem the chief difficulty in these cases, will be considered subsequently under another heading.

The cavity outline.—The proper marginal outline of the cavity becomes a matter of vital importance in its relation to the probable permanence of the operation. The reason that many of these fillings fail so early after their insertion may be traced to the fact that in the preparation of the cavity the margins are not extended to include all of the affected enamel. If we study the manner of progress of this form of decay, it will enlighten us greatly as to the necessities of the case in treatment. Occasionally we may find these cavities well defined in outline with a notable penetration of decay at a given point, and when such is the case with a surrounding surface of perfect enamel our method of procedure is clear. We need very little extension of the margins.

But in the vast majority of cavities occurring on these surfaces it will be found that the area of decay is ill defined, and that the enamel is more or less disintegrated along the surface leading from the cavity and following the margin of the gum. This affected enamel must invariably be included in the cavity outline and replaced by filling-material if we are to be assured of permanent results. The fact that disintegration has commenced is conclusive evidence that the active agent of caries has found this particular point of the surface a suitable field upon which to work its destructive processes, and the assumption is clear that unless the conditions are radically changed the process will continue. The surest method of changing the conditions is to remove the area of tissue upon which the micro-organisms of caries are known to act, and replace it with filling-material upon which they cannot act. This one fact that enamel is vulnerable to the attack of micro-organisms, while filling-material is not, should give us a clearer conception of the required line of treatment in all those positions which are subject to the influence of the destructive agent. The broader we make our metal surface at the expense of the enamel-surface, the more certain we are to avoid a recurrence of decay, and yet this does not imply that we must ruthlessly or ill-advisedly carve away sound enamel for the purpose of making a broad metallic area. It simply implies that we shall not stop short of reaching perfectly sound enamel in the extension of these cavities, and that particularly in positions suitable for the lodgment of micro-organisms we shall be especially thorough.

The surface of the enamel surrounding one of these cavities must be critically examined for defects. Sometimes a crescentic line of discoloration extends from the cavity in such a manner as to confuse the operator with regard to the true condition of the enamel under it. It may be simply a discoloration on the surface, with sound enamel below it, or the enamel may be softened to considerable depth and the discoloration tend to hide the defect. The only way to determine the true condition of the enamel is to thoroughly polish away the discoloration with pumice carried on a brush in the engine. If the brush succeeds in removing all the discoloration, leaving a white and glistening surface to the enamel, we may know that the destructive agent of caries has not yet affected it, but if the enamel shows disintegration on its surface after the brush has been used, we must cut out this disintegrated tissue, even if it has not already penetrated the entire depth of the enamel.

The proper extension of the cavity rootwise involves the carrying of this margin well under the gum. There are two reasons for this,—first, the one already given in connection with approximal cavities, that wherever the filling is carried under the free margin of the gum there will be no recurrence of decay at that point, and second, that the gum is more likely to remain healthy when overlapping a smooth gold filling than when overlapping tooth-tissue, particularly if there has been any recession of the gum. This latter statement may appear illogical at first thought, but a somewhat close clinical observation would seem to confirm it beyond any doubt, and a careful study of the conditions will suggest a tenable reason therefor. In all cases where there has been any extended decay it will be found that the margin of the gum has been interfered with in one of two ways. Either the decay has crept up under the gum, leaving the free margin lying in the cavity in an unhealthy condition, or else the gum has progressively receded and is lying against the cementum instead of enamel. In the latter case the cervical outline of the cavity is usually ill defined, with little penetration of the carious process. Under either of these conditions the gum will be found abnormal. If in the preparation of the cavity we press back the gum gently but to considerable extent and make the cervical margin of the filling sufficiently rootwise, we shall find that the gum will rapidly cover it in a healthy condition. Not only this, but in many cases the gum will creep so far crownwise as to cover the neck of the tooth and filling far in excess of its position before the operation. It apparently takes more kindly to a smooth gold surface than it does to cementum which may be denuded, or to enamel which may be slightly roughened. Some extreme cases of this kind of gum-reproduction have been noted, particularly in cuspids, where the gum has been known to cover the cervical portion of a filling to the extent of over two millimeters. Such results as these are sufficiently gratifying to reward the operator for the necessary expenditure of energy, and the patient for the discomfort accompanying the work.

In cases where it seems impracticable to force back the gum sufficiently by pressure, it may be slightly cut perpendicularly, as indicated in Fig. 31, when the flaps will readily yield to slight force and expose the neck of the tooth. After the completion of the filling these flaps will readily reunite, provided the operator has been careful not to lacerate them. In very large decays, where the gum has filled the cavity with a hypertrophied mass, it should be cut out with a lancet and the cavity packed with gutta-percha for some days before attempting to fill. The gutta-percha should be allowed to extend well over the cervical margin of the cavity so as to force the gum back and expose the margin perfectly. This will greatly facilitate the operation and avoid laceration of the gum.

FIG. 31.

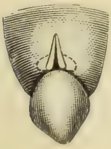


FIG. 32.

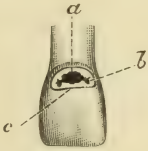


FIG. 33.

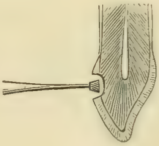


FIG. 34.

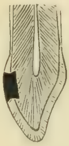
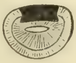


FIG. 35.



In Fig. 32 will be seen a central incisor, with the cavity *a* penetrating through the enamel, *b* defective enamel extending from cavity, and *c* the proper outline of filling.

The cavity walls.—The plan of anchorage for these fillings is exceedingly simple. There is no need for the deep undercutting sometimes resorted to by operators, all that is necessary being to give a mortised form to the cavity by making the axial wall flat and the surrounding walls at right angles to it. At two points in the cavity it is well to make a slight dovetail to more securely lock the filling into place, viz, at the mesial and distal extremities. To this end the axial wall should be made slightly wider mesio-distally than the orifice of the cavity at the dentinal enamel-margin. This is especially true where amalgam is to be used on the buccal or lingual surfaces of molars. Amalgam requires broader and deeper anchorages to hold it in place than does gold, and this fact should be noted particularly in those cases on molars where the cavity passes so far mesially and distally as to curve somewhat toward the approximal surfaces. These are the cases where amalgam is so often seen to curl away from the cavity at the extremities, admitting a leak around the filling. If amalgam is to be held securely in position in buccal or lingual cavities, it must be placed in broad, dovetailed anchorages.

Technique.—In many of these cavities it will be found that while the enamel is completely disintegrated and dissolved away, the dentin maintains practically its original form, being simply softened or decalcified for considerable depth without breaking down. This softened mass of dentin is best removed with a hatchet excavator, the blade of which is thin, delicate, and exceedingly sharp. The keen edge of the blade is placed on end at one extremity of the cavity and forced to the full depth of the decay. Then by a dextrous turn the whole carious mass is rolled out of the cavity in one piece, thus removing at a single sweep what is ordinarily the most sensitive portion of the tissue. This, if done skillfully, is usually not a very painful proceeding, but there must be no half measures about it. Any picking or manipulation of the carious mass bit by bit is simply excruciating as well as ineffective. The operator should be at the same time gentle and thorough. His touch should be delicate and forceful, his movements definite and rapid.

When the softened dentin is removed with the excavator the next step is to give form to the walls. This is best done with an inverted cone bur stood with its end against the axial wall, Fig. 33, and carried mesially and distally across the cavity till the desired form is obtained. This kind of bur gives the proper shape to the walls and leaves a mortised effect, as shown in Fig. 34. As the bur approaches the mesial and distal walls of the cavity it should be carried somewhat into these walls to give a dovetailed form, as illustrated in the cross-section of an incisor, Fig. 35. In posterior teeth inaccessible to the straight hand-piece the desired result may be attained by using an inverted cone bur in the right-angle hand-piece.

When the walls are formed the enamel-margins may be beveled with a sharp chisel, or, what is preferable when properly used, a round bur in the engine. This must be kept under perfect control and made to follow the margin without slipping out of place. To maintain a bur in its proper position in following the margins of a cavity it is often advisable to let the shank rest on a support or fulcrum formed by some adjacent surface of the enamel. In this way the bur may be accurately guided along the margin so as to cut at any desired angle. A more perfect symmetry may be given to a margin with a revolving instrument like a bur than is possible with a chisel. This is particularly true of the curves in the cavity outline.

General Considerations.

As has been stated, these cavities are often the most dreaded of any by the majority of operators. That they present elements of difficulty peculiar to themselves is undoubtedly true, but if treated on correct principles they are in many respects the most satisfactory of all filling-operations. The problem of anchorage is exceedingly simple on account of the lack of any stress tending to dislodge the filling. The marginal outlines of the cavity, if properly formed, are comparatively safe from recurrence of decay, through the fact that the gum completely protects the cervical margin and the other margins are kept clean by friction of the cheeks, lips, or tongue. The open aspect of these cavities admits of an accurate placing of the gold and a close scrutiny of the margins to detect and correct any imperfections.

The chief difficulties of management relate to forcing the gum out of the way sufficiently to admit of free working, to keeping the cavity dry, and to the supposed fact that these cavities are usually more sensitive than others. As to the latter complication, it is counterbalanced both for the patient and operator by the rapidity with which such a cavity can be prepared, and the discomfort in the aggregate is therefore not much greater than with other cavities of similar extent. The problem of managing the gum and keeping the cavity dry is simply a question of skill and "knack" which may be acquired by almost any operator who will give a close study to the special requirements of the case. With this skill once developed these cavities are readily brought under control.

Occlusal Cavities in Bicuspids and Molars.

These cavities are usually the result of structural imperfections in the tooth by which the developing islands of calcification, beginning at the tips of the cusps, have failed to properly unite on approaching each other, leaving a leak for the ingress of foreign matter. The chief considerations in the management of these cases relate to the breaking down of overhanging enamel, the removal of decay, the obliteration of any remaining structural imperfections in the way of fissures extending from the cavity, and the proper retentive form for the filling.

An important distinction between caries occurring upon these surfaces and that of other surfaces already considered is due to the fact that upon occlusal surfaces decay seldom occurs except as the result of defects in the enamel, while on the others it is often found beginning upon perfectly formed enamel. The reason for this is that the friction of mastication very largely prevents the possibility of decay upon the occlusal surfaces, except as the agent of caries is harbored in some crevice or fissure where the cleansing process of mastication cannot reach. On this account extension for prevention is seldom indicated on occlusal surfaces unless the drilling out of all fissures running from the cavity may be so interpreted.

This problem of the treatment of fissures is one indissolubly linked with the management of these occlusal cavities. Many operators do not seem to consider it necessary to drill out fissures unless actual decay has begun in them. They overlook two things,—the difficulty of making a good margin to the filling at the intersection of a fissure, and the real nature of the imperfection that a fissure represents. If an operator has any doubt as to the necessity for drilling out all fissures extending from a cavity under preparation, let him make a microscopical examination of sections of teeth cut crosswise of a fissure, and he will no longer hesitate. In many of these cases where the orifice of the fissure is so narrow as scarcely to admit the finest exploring instrument, the microscope will show a decided imperfection reaching entirely through the enamel, as indicated in Fig. 36. This kind of a break in the enamel-surface is a serious menace to the tooth, and no operator is doing his duty by the patient when he leaves such a defect in connection with his work. It is the minutiæ which count in dental practice, and microscopic conditions must not be ignored.

It would be a revelation to many operators to turn the microscope upon cases similar to the ones they are treating every day, and see the numberless imperfections which the unaided eye cannot detect. One of these fissures, apparently so slight as to be of little moment, and which the blunt exploring instruments in common use in offices will scarcely penetrate, may be found large enough on microscopical examination to admit a whole army of micro-organisms sufficient, if the conditions be favorable, to undermine the tissue in a few months. If we are to successfully combat this disease of dental caries we must be observant and infinitely painstaking.

Fig. 36.

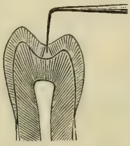


Fig. 37.

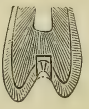


Fig. 38.

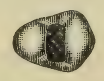


Fig. 39.

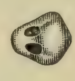
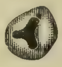


Fig. 40.



Another reason for drilling out these fissures and filling them is because the surface of the tooth is thereby rendered more perfect in form. In almost every case where a fissure exists there will be found a somewhat notable depression in the enamel leading down to it, and this V-shaped sulcus furnishes a receptacle for the lodgment of certain kinds of food material, to the annoyance and discomfort of the patient. Berry seeds and other like substances are especially prone to lodge in these depressions, and comfortable mastication is thus interfered with. It should be the office of the dentist to correct, if possible, any faults of form in the teeth he is operating on, and this may readily be done in the case of fissures by drilling them out and building up the filling as illustrated in Fig. 37. This change in the form of the occlusal surface does not in any way detract from the efficiency of mastication, because the biting force of the cusps of the opposing tooth will be fully as effective—if not more effective—when exerted against a moderate concavity such as the surface of the filling would present, as it will when brought to bear upon a V-shaped depression.

The marginal outlines.—The outlines of the different cavities on the occlusal surfaces will vary greatly according to the kind of tooth and the particular conditions present in each case. The number of cusps and the direction of the fissures seem to be the most prominent factors in determining cavity outline, while the extent of decay is of course always to be reckoned with. What may be considered typical cavity outlines are here illustrated in the different teeth. Fig. 38 shows the occlusal surface of an upper bicuspid with filling in place. This is almost universally the form for these teeth where the slightest decay has begun upon the surface, even if only one pit at the termination of the central groove has been affected. The reason for this is that the groove is nearly always fissured throughout its length, and even when not fissured it is sufficiently sulcate to prevent the proper finish of a filling against its intersection. In lower bicuspids—particularly in the first—the transverse ridge of enamel leading from the buccal cusp to the lingual is often so prominent and so perfect in structure as to leave no central groove, thus dividing definitely the mesial and distal pits. In these cases the pits may be filled separately, as illustrated in Fig. 39. In the lower second bicuspid the outline may sometimes simulate that of the upper bicuspids, while in occasional cases we find three cusps on this surface, necessitating the outline given in Fig. 40. In the upper molars there are usually two cavities corresponding to the central and distal pits, as shown in Fig. 41, or the disto-lingual groove may be fissured throughout its length, resulting in an outline such as that in Fig. 42. In cases of extensive decay, where the oblique ridge of enamel between the central and distal pits is so seriously undermined as to jeopardize its stability, it should be cut away and a cavity formed like the one in Fig. 43.

FIG. 41.

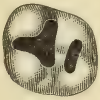


FIG. 42.

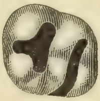


FIG. 43.

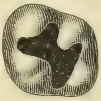
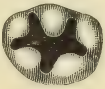


FIG. 44.



It is sometimes a point of nice distinction to determine whether this ridge shall be left standing or be broken down, the decision being based principally upon two factors,—the extent of dentin supporting it and the depth of the distal groove. If it is not well supported by dentin it will prove an element of weakness between the two fillings, and if the groove is sufficiently deep to present a notable depression at this point it will leave an undesirable form to the surface. The operator must decide on the basis of long-continued usage in the future rather than from past usage or a temporary service. One condition in this connection is calculated to mislead an unobservant operator, and this holds true as well of other walls on the occlusal surfaces as of the one under consideration. The fact that a certain wall has stood without fracture up to the time of the operation is often accepted as an indication that it may safely be left around a filling. The argument is used that if it has not broken when surrounding a cavity it certainly will not break when reinforced by a filling, but an important factor in the case is overlooked. When a tooth begins to decay it is often more or less sensitive under mastication, and the patient involuntarily forms the habit of favoring the tooth so that it does not receive its full share of masticating usage. The decay progresses till the enamel is so undermined as to leave very weak walls, which may stand indefinitely under these conditions, so far as the stress of mastication is concerned. But when the cavity is filled and the tooth rendered comfortable, the patient gradually begins to use it again, and the consequence is often fractured walls when the operator had judged them to be safe. The highest class of service to our patients demands the closest insight into all of the factors making for or against the success of our operations.

The cavity outlines on lower molars differ from those on upper molars, and there is also a variation between the lower first molar and lower second molar. The lower first molar has five cusps intersected by grooves which are frequently fissured, thus resulting in a cavity outline such as is illustrated in Fig. 44. Occasionally the buccal groove and the disto-buccal groove are fissured throughout their length, which would result in the filling being carried over on the buccal surface to the full extent of the fissure. When this is done the buccal extremity of the cavity should present the form in Fig. 45. The lower second molar, having four cusps, calls for a cavity outline similar to that in Fig. 46. The third molars, upper and lower, are so variable in form as to preclude the possibility of suggesting anything like a uniform cavity outline in either of them, each case calling for special consideration as it presents itself.

FIG. 45.

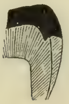


FIG. 46.

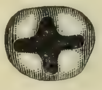


FIG. 47.

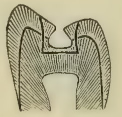
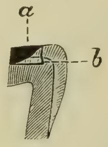


FIG. 48.



The cavity walls.—The walls surrounding these cavities should be perpendicular, or in line with the long axis of the tooth. The pulpal wall or seat should be horizontal or flat, and should join the other walls at right angles. (Fig. 47.) This is particularly true of the mesial, distal, buccal, and lingual extremities of the cavity. On account of the difficulty of making a perpendicular wall at the termination of a fissure, the cavity extremities are sometimes left as illustrated in Fig. 48, *a*. This is an incorrect form, no matter how well the filling may be anchored in other parts of the cavity. In every case it should be formed as in Fig. 48, *b*. The reason for this is that the extremities of the fillings formed like that at *a* are likely to be lifted out of place in the mastication of adhesive materials such as candies, etc.

The depth of the cavity pulpally is governed in the carious portion by the extent of decay, and in the fissured portions by the depth of the fissure. It will be found that anything short of a full extension to the depth of the fissure will result in so shallow a cavity as to render the filling-material weak. Numerous failures of portions of these fillings along fissures have been noted in consequence of insufficient bulk of material. There can be no argument against deepening the cavity to the full extent of the fissure from the fact, as already stated, that wherever a fissure exists there is no binding strength to the tooth throughout its extent. The certainty of determining definitely just when the bottom of a fissure is reached is sometimes rendered difficult on account of the fine particles of tooth-tissue from the drill filling the deepest portion of the fissure and hiding it from view. This may readily be overcome by flooding the cavity with one of the essential oils, which will cause the fissure to immediately show up dark and present its entire outline.

The width of the cavity bucco-lingually or mesio-distally in the decayed portion must be great enough to insure strong, well-supported walls, while in the fissured portion it must be governed somewhat by the extent of the sulcus leading down to the fissure. The minimum width in any case should be not less than one and one-half millimeters. The mistake of leaving too narrow a cavity relates to the difficulty of readily securing adaptation and density of gold in a constricted crevice, besides the important factor of providing for a sufficient bulk of filling-material to represent considerable strength on all surfaces which are subjected to continued usage.

Technique.—All overhanging walls may be broken down with sharp chisels, and the fissures opened with drills as already described. The cavity may be cut to form with an inverted cone bur placed with its end looking toward the pulp and carried laterally to the extent required. In cases difficult of approach with the straight hand-piece,—particularly on the lower teeth and the upper teeth of the left side,—the bur may be used in the right-angle hand-piece. Where the decay is extensive the softened dentin should be removed with spoon excavators to avoid unnecessary pulp-exposure. The enamel-margins may be beveled with a round bur. These cavities are cut to form very expeditiously, provided the operator uses sharp burs and goes straight to his work with a definite idea in his mind as to the required outline and form of the cavity before he begins cutting.

General Considerations.

Of all filling-operations in the mouth these should prove the most permanent and satisfactory if properly performed. There is little likelihood of a recurrence of decay around such fillings unless the operator has left imperfections in his work which would invite failure under any circumstances. The wear and tear upon occlusal fillings is sometimes great, but it is confidently believed that with the plan of anchorage here outlined ample provision is made for sustaining the filling against severe usage. The flat base to the cavity secures immunity from movement, and the perpendicular walls leave no overhanging enamel to be broken down. The obliteration of fissures results in improved form to the surface and precludes the possibility of micro-organisms finding a habitat in this region. Operations here as elsewhere must be carefully planned and executed throughout, but the results on occlusal surfaces are never so much in doubt as they would seem to be in other localities.

(To be continued.)

THE MODIFYING INFLUENCE OF VITALITY IN DENTAL CARIES.

BY DR. S. BLAIR LUCKIE, CHESTER, PA.

(Read before the Pennsylvania State Dental Society, July 13, 1898.)

THE causes of disease have engaged the attention of painstaking and ardent students from early ages to the present time. The conclusions of the ancients were founded upon experience and observation. Their theories were often ingenious, and some of them possessed with elements of truth that modern investigations have affirmed.

Before the Christian era there existed a belief that epidemic diseases were produced by micro-organisms, or as then called, small animals, but not until near the middle of the nineteenth century did the researches assume a truly scientific character, this being due to the improvement of the microscope and the knowledge of histologic structure that followed. The constant and persistent prosecution of the work since has established irrefutable evidence that a large number of diseases are excited by microbic products.

The observation and experience of clinical work seems to have foreshadowed the deductions of science in the studies of some of the zymotic diseases, though the germ theory of dental caries is of modern acceptance, many causes having been assigned before micro-organisms were arraigned as being guilty of the work.

The question now upon which much depends, both for conclusion's sake and the benefit humanity will receive, is, How do the products of microbes obtain mastery over the resistance of the tissues, or what is the predisposition that makes it possible for physiological conditions to become pathological in character?

Predisposition, when applied to diseases of microbic origin, implies a peculiar condition of the fluids or cells of the body which renders them unable to repulse the encroachment of germs that are pathogenic, and immunity is the opposite condition, as an organ or the body is said to be immune when able to resist infective processes.

Immunity may be natural or acquired, transient or permanent.

Natural immunity is inherent in the tissue or system. Acquired immunity is produced by inoculation with attenuated virus, by injection of chemical compounds, by previous attacks of a disease or its modified form, and by injection of serum obtained from an animal possessed with natural immunity.

But little knowledge has been advanced of late regarding the theory of immunity; most investigators of the subject, however, agreeing that it is due to a constituent of the serum of the blood.

Animals that in a normal condition possessed a tolerance for the poison have been rendered susceptible to a disease.

Thus the white rat, though possessed with a natural immunity against the bacillus of anthrax, can be made susceptible by being compelled to run a treadmill until exhausted, or as Pasteur rendered the chicken susceptible to splenic fever by reducing its temperature in a bath of cold water. Pigeons and dogs possess but slight susceptibility to tetanus, and can be made still less so by being treated a number of times with small quantities of the virulent culture, and eventually will become possessed with a high degree of immunity, and their blood be used to secure immunity in other animals. The blood of the horse can have its diphtheria immunity constituent increased to a high degree, rendering it valuable for the prevention and treatment of diphtheria in the human species.

Thus we have evidence that a bacterium may grow and multiply in one animal and produce disease, while it is unable to do so in another, and the animal possessing sterile soil may be advantageously used to produce sterility in another of the same or different species, and sterile soil can become favorable for bacterial growth by interference with normal conditions, demonstrating that there is in the animal economy a fortified something that is antagonistic to disease.

There are differences of opinions, though, thus far in the study of immunity as to the methods by which immunizing substances act, and which render the practice somewhat uncertain. Some claim that the antitoxins are bacterial proteids, that they should be as free from toxin as it is possible to get them, and be prepared in the form of serum by passing the cultivation through the animal body; others express opinions opposite, some that natural immunity is a hereditary transmission, the leucocytes being possessed with bactericidal power.

Whether this bactericidal power is possessed by the leucocytes or the humor is not definitely settled; perhaps they work together; it is, however, plausible and a recognized belief that the ability of attacking organisms to interfere with health and produce death must depend upon the capability of the tissue to resist the attacking agent.

Buchner states as his belief that there is no such thing as a curative serum, but that in immunizing substances there is that which, under favorable circumstances, may produce acquired immunity and arrest further progress of pathological disturbances, providing the cells of the body have not been already reduced to incapacity for reaction by the debilitating effects of the disease upon their vitality.

Other experimenters also have expressed a belief that the effort to obtain acquired immunity or to resist the predisposing cause of disease becomes more uncertain in advanced cases.

The experiments and demonstrations thus far made, as for practical purposes, show that little more has been proven than that the efforts to procure acquired immunity have been harmless to life, and that the best results are obtained when the inherent force of vitality of the tissues or the general system has not been reduced by the disease it is desired to arrest, or by hereditary weakness, environments, or exhaustion from any source.

That this line of experimental work may yet accomplish much to subdue the ravages of disease and prolong life is to be desired, but the recognition of the phenomena known as vital force should not have its importance eclipsed by what seems to be a lesser light.

There has been a doctrine in existence for a long time that has been heard of but little since the impetus given to the study of bacteriology. I allude to the doctrine of vitalism, which ascribes every function of the organism to the agency of a vital principle or force.

Of this doctrine Dr. S. Solis Cohen says, "That which is wanting in individuals who become tuberculous is the life force, the vital energy,—an energy which we know to exist because of its manifestations as fully as we know electric energy to exist; and physicians of the vitalist school must not be reproached with speaking of a form of energy they cannot explain, unless the same reproach is to be directed against physicists for the use of hypotheses involving electric energy."

The success of antiseptic surgery rests upon the tripod of skill, thorough cleanliness, and the vitality of the patient; each support contributes in prognosing the winning chances of the patient returning to health; the extent of the operation modifies the important consideration of each separate support; as the operation involves the risk of life, vitality of the patient becomes of increased importance. If in surgery antisepsis or in medicine immunizing efforts should hold autocratic sway over the ability of the tissue or system generally to become victorious in the conflict, much must be lost to the science of cure.

Lawson Tait gives three factors upon which surgical success depends: "The condition of the patient, the conditions of his surroundings, and the nature and extent of the operation," and discussing each factor separately closes by stating that "the power of vital resistance by the tissue or the condition of the patient, and the nature and extent of the operation, are of infinitely greater importance as factors in the general results." Recognizing immunity and acquired susceptibility to disease where toxicogenic germs are factors, Vaughan and Novy say, "In the study of these we must not only ascertain the nature of the poisons which they produce, but must know the conditions under which they can multiply and elaborate these poisons."

Since the investigations of Dr. Miller and his explanation as to the manner micro-organisms become the exciting cause of dental caries, the theory is generally accepted. The predisposing cause has heretofore been explained by the fact that teeth contained fissures, grooves, and irregularities on their surfaces, and these with the surfaces not easily cleansed by the act of mastication were favorable points for the germs, which excrete acid and thus decalcify enamel and dentin, to attach themselves and multiply.

Dr. J. Leon Williams in a series of articles entitled, "A Contribution to the Study of Pathology of Enamel," endeavors to show a comparison of the enamel of the human teeth with those of the teeth of some of the primates which stand next to man. In his illustrations he plainly shows that what has heretofore been considered pathological in the human enamel is also existing in the enamel of those anthropoids which are free from dental caries. These illustrations show pits in the enamel extending to the dentin, ending, in some cases, in large globular masses of amorphous enamel, and the dentinal fibrillæ penetrating into and terminating in bulbous enlargement in the crevices and spaces.

Deep pits with flask-shape terminations would seem to be a favorable condition for the propagation of bacteria, and in examination of mouths of our patients it is not unusual to find a crevice in the sulcus of a molar or bicuspid into which with difficulty we can pass a small exploring point; when, however, chiseling is resorted to we may have revealed a carious cavity in size from the smallest needing filling to one encroaching upon the structure of the pulp. Thus clinical observation when confined to local area might be sufficient to produce the impression that predisposition to dental caries can be explained by defects of structure, and treatment must be mechanical, or if of another nature instituted before formation of enamel tissue.

Dr. Black, in vol. xxxvii, page 416, of the DENTAL COSMOS, asserts, as his conclusions resulting from his investigations into the physical character of the human teeth, that "the active cause of caries is a thing apart from the teeth themselves acting upon them from without, and from a consideration of the facts thus far developed, the logical inference is that the cause of the differences in the liability of individuals to caries of the teeth is something in the constitution, operating through the oral fluids, and acting upon the active causes of caries, hindering or intensifying its effects," and that "caries of the teeth is not dependent upon any condition of the tissue of the teeth, but on conditions of their environment. Imperfections of the teeth, such as pits, fissures, rough or uneven surfaces, and bad forms of interproximate contact, are causes of caries only in the sense of giving opportunity for the action of the causes that induce caries."

That Dr. Williams in his presentations of the pathology of the enamel, and Dr. Black in his conclusions regarding the physical character of the human teeth, are scientifically correct, seems to me must be accepted, and conclusively with such acceptance the cause of the difference in the liability of individuals to and the immunity of lower animals from caries of the teeth is something in the constitution, and this something not only operates upon the oral fluids but also through the pulp, modifying the active cause, and it must be sought for in the force of vitality possessed by the individual or animal.

This assertion assumes that a diseased condition is attained at the first departure from the very pivotal point between normal condition and that condition of abnormality that precedes its recognition by the aided vision of man, and apparent perfect health is by no means a conclusive evidence of the power of resistance.

For the sake of analogy I quote again from Dr. Cohen on tuberculosis. He says, "That condition which makes the human tissue a receptive 'soil,' a favorable 'culture medium,' for the tubercle bacillus—that condition which of old was called 'diathesis' and now susceptibility—is itself a disease, a departure from the norm; and I believe it to be the most important element in the morbid complexus termed tuberculosis. . . . Microbes, apparently pathogenetic, are constantly gaining admission into the body in the respired air, in food, and by other channels. To guard against their entrance by every possible precaution is wise. . . . . Here, however, it is desired to emphasize the fact that independently of the invasion of microbes associated with tuberculosis there is a disease to be treated, and if this disease be successfully treated the microbes will come and go harmlessly. If the defences on the frontier are kept in order, the enemy cannot penetrate into the country."

Degraded tissue from any causes or combination of causes must be considered a disease, as it is the fundamental disorder and liable for the destructive work of the microbes.

According to Dr. Miller's work, the human mouth presents almost a perfect breeding-place for pathogenic bacteria other than those that attack the teeth, and might well be considered the entrance portal for many that attack organs of the alimentary canal, the thoracic and visceral cavities. Considering the victorious engagements and the number and persistence of microbes that are in existence, it is important from a prophylactic and therapeutic standpoint to consider degraded or degenerated tissue and its relation to vital force in dental caries as well as other diseases.

What vital force is we know nothing more about than we know about electric force, gravitation, or chemical affinity, but its phenomena are as open to investigation, and though they may not be identical they are analogous, as they take place according to regular designs and under fixed conditions.

We recognize life in the production of the germ, and it is manifested by growth and reproduction, and if the acts of the organism and the stimuli that called it into action continue to supply the necessaries for growth and production, and are harmonious, the results are satisfactory for the normal continuance of the phenomenon, but when there is a difference on either hand there is a difference in results, though it may be a variation only without our ability to detect it. Along with this is also manifested a persistent tendency to preserve existence and protect against injuries from external agencies. When this tendency to preservation is weakened the component parts of the organism begin to disintegrate, and if unarrested the ultimatum is death. To detect this departure from the normal is not possible in its early stage, as the intricacy of the combination under which the vital force maintains its equilibrium between its stimuli and external conditions makes it difficult to attain definite knowledge, but it is not beyond the reach of persevering and intelligently directed efforts by philosophical methods of inquiry to obtain a knowledge that may be used for practical purposes, and so reduce the number and malignancy of diseases, both those zymotic in origin and others produced by poisons generated within the body by chemical processes.

That departure from the truly normal is the first condition that may result as a detriment to the whole organism, but if the constructive processes within the tissues are in accord with the destructive ones, and vital activity is neither accelerated nor retarded, health is maintained and the defences on the frontier are in order.

Vitiated air, excessive indulgences in food and drink or any of the duties or pleasures of life, exhaustion from excessive overwork, and refraining from needed exercise are productive of interference with the metabolism of the tissue, and when continued for generations produce hereditary taints or dyscrasia. The results as manifested in disease of different organs are manifold, and the teeth, as a logical consequence, must share in this train of evils, as they cannot elaborate from the blood-supply that which gives resistance to the invasion of pathogenic bacteria.

Artificial caries according to Dr. Miller progresses much more rapidly than caries in teeth with either living pulps or those that are pulpless within the mouth. That pulpless teeth within the mouth decay less rapidly than teeth in which artificial caries is produced might seem to confirm the conclusion that caries of the teeth is not dependent upon the condition of the tissue, but on conditions of their environment.

When Dr. Black asserted that the logical inference is, "That the cause of the difference in the liability of individuals to caries of the teeth is something in the constitution, operating through the oral fluids, and acting upon the active cause of caries, hindering or intensifying its effects," he seemingly ignored the pulp as an active agent in the process. In clinical work pulpless teeth do not, if conditions are equal, appear to have the ability to resist caries that teeth containing living pulps have.

A tooth containing a deep fissure with a flask-shape termination presents a point favorable for the ingress of germs and protection from their removal by mechanical means, and if it were not for the fact that in a tooth with a vital pulp they are very close to the prolongations of the pulp they would progress more rapidly with their work of destruction, as the variation of the vital force as manifested in the pulp and through the fibrillæ will modify or accelerate the progress of the carious action. I would not detract from the importance of the fact that the difference in the disposition of different teeth, and of teeth in different individuals to be attacked by caries, is something in the constitution acting through the oral fluids, but the vitality the tooth receives from its pulp is too important to the clinician as a guide in his work to be treated as a nonentity in the etiology of caries; and I think the same something can exert its life protection through the pulp as well, and the same variation from normality to degeneration bordering on suppression of the vital force be manifested through this source as is manifested throughout the tissue of other organs.

If a pulpless tooth appears to resist the carious process, it apparently is because its conditions are unfavorable for the lodgment of germs either through the process of growth favoring it with enamel devoid of suitable points for their attachments, or becomes so by the mechanical treatment of filling, thus leaving it free to be cared for by the mercies of that which operates through the oral fluids and other environments.

Vitality may be diverted from a part or be insufficient for the sustenance of an organ for a time, and be toned again to its normal condition. We often see this in the teeth: rapid caries may be arrested by the removal of carious substance and the filling of the cavity with material that is in consonance with the tooth-tissue, and noticeable effects be seen in the whole tooth for better self-protection. A tooth or teeth that have been unable to perform the function of mastication by the loss of antagonizing teeth will show signs of rapid caries, or if antagonists be substituted a return to better conditions be noticed. These cases, so familiar to all of us, seem to indicate that the pulp is not a passive organ in the carious process, but can exert some influence in modifying the rapidity of caries, especially of the dentin, and probably prevent the commencement in deep fissures if the fibrillæ are prolonged into it.

In conclusion, the object in presenting the foregoing is to draw attention especially to the resident vital force in the dental pulp, and the manifestation of that force, through this formative and supporting organ, in modifying caries,—recognizing, however, that the vital principle has its influence made apparent through other sources; and until the plausibility that acquired immunity from caries becomes a fact and can be practiced with a desirable degree of success, our attention must be given to treatment that will protect the vital portion of the teeth by the proper preparation of cavities and selecting and introducing the filling-material according to physical conditions. This and oral cleanliness, with the knowledge of the laws of health being imparted to our patients, will assist with other sanitary work in giving the vital principle an opportunity to modify the work of the enemies of mankind.

CATAPHORESIS.

BY JOHN M. FOGG, D.D.S., PHILADELPHIA, PA.

(Read before the Pennsylvania State Dental Society, July 13, 1898.)

WITHIN the past two years this subject of electrical osmosis has occupied a very prominent place in the dental mind. It has been the theme of such widespread discussion that it would seem well-nigh impossible, in the light of present developments, to offer you anything new upon it.

It is, therefore, not my intention, nor is it within my ability, to present anything very new or original in this paper, but rather to offer for your consideration some methods and their results, gathered from an experience that has been somewhat extensive. To some of you what I shall say is but a repetition of what you have already heard, but of such I ask indulgence, in the hope that to a few others it may be of some benefit.

First, and most emphatically, would I call your attention to the numerous applications and broad field of usefulness of the principles of electro-therapeutics in dental practice. In the minds of many practitioners the utility of cataphoresis is limited to its action in anesthetizing sensitive dentin and exposed pulps and in bleaching discolored teeth, and while its great value in these cases is not to be controverted, it is one of the objects of this paper to point out the numerous other directions in which cataphoresis is equally valuable.

The term cataphoresis is here used merely as a matter of convenience, and because of its general adoption by the profession. It needs but a moment's reflection, however, to demonstrate its inaccuracy. The meaning of the word, and the action therein implied, is the penetration of tissue by a drug, from the positive pole or anode, in the direction of the negative pole or cathode. It was formerly supposed that all drugs acted in this way, but later experiments have shown that many of them are carried into the tissues only when applied upon the negative pole. It is plain, then, that neither the term cataphoresis nor anaphoresis, which has been suggested as a substitute, conveys more than half an idea of the action which takes place. For this reason the term electrical osmosis is, in the writer's opinion, much to be preferred for its accuracy, though it is doubtful if the shorter and more convenient term of cataphoresis will soon be supplanted.

In addition to the osmotic action of drugs applied with the electric current, there occurs in many instances an electrolysis, or chemical decomposition, of the solution employed, and certain of its elementary constituents are attracted toward the positive pole, while others accumulate at the negative pole, or *vice versa*.

Frequently a solution may be acted upon by either the positive or the negative pole, but with different results, according as one or the other is used. Thus potassium iodid, when applied upon the negative pole, is conveyed into the tissues operated upon as potassium iodid and without chemical decomposition, while the same solution upon the positive pole will be decomposed; free iodin will travel toward the negative pole, the remaining constituents returning to the positive.

It may be stated as a general rule that all agents whose action it is to displace hydrogen should be applied upon the negative pole, although it cannot be said that all others are to be applied upon the positive pole, as is demonstrated by the action of potassium iodid just described.

Among those agents which act to displace hydrogen may be considered the bleaching preparations, such as pyrozone, sodium dioxid, etc. The property possessed by these agents of bleaching discolored teeth is due to their oxidizing effect upon the contents of the dentinal tubuli,—in other words, their oxygen displaces the hydrogen of the effete organic matter which creates the discoloration. In accordance, then, with the general rule above stated, all bleaching applications should be made on the negative pole, and my experience in these cases has proven, to my satisfaction, at least, the truth of this theory.

The statement has more than once been made that the cataphoric current is of no value in tooth-bleaching operations, and that equally good results may be obtained without its assistance. While this may have been true in some cases, it has been my universal experience that the electric current does materially improve and hasten the bleaching process, if the proper technique is observed.

To this end, the first consideration is to obtain, as nearly as possible, a perfect insulation of the tooth to be operated upon. A number of special appliances are manufactured for this purpose, but they are all open to the same objections, in that they completely cover the tooth, concealing it from view and making it impossible to note the progress of the operation.

A method preferable to this is to apply the rubber-dam over the affected tooth and one other; all metallic fillings, in either tooth, are then covered with some non-conductive solution, such as chloro-percha, and the same applied around the cervical borders. The mouth of the canal, or canals, should be sealed with gutta-percha, and absolute dryness obtained by means of alcohol and compressed air.

If these preparations are carefully made, the result must be a thoroughly insulated field for operation. This having been obtained, an application is made in the cavity of a dilute solution of sulfuric acid with the current, and continued for about five minutes.

Just what may be the action of the acid under these circumstances I am not yet prepared to say. Its application is not original with me, though I have forgotten to whom the credit of it belongs, but I have found, from practical experience, that it greatly facilitates the bleaching process.

The case is now ready for the application of the bleaching agent, which should be chosen to meet existing conditions dependent upon the cause or causes of discoloration.

Full information upon this subject may be found in Dr. Kirk's admirable publications upon the chemistry of tooth-bleaching, so that a discussion of it in this place would be superfluous.

The solution to be used is applied in the cavity upon cotton, and the platinum point of the negative electrode placed in position. It is desirable that an electrode with as large a contact surface as possible should be utilized, and one of spatula form or one with a broad tip is therefore preferred. Another point greatly to be desired is that the electrode may be firmly fixed in position, insuring a uniformly steady contact, and relieving the operator of the fatigue involved in holding it for any length of time,—thus, also, both hands are left free for use.

The fixation of the electrode may be accomplished in most cases very readily. A number of instruments, designed for use in conjunction with rubber-dam clamps, are manufactured for this purpose, and it is often quite possible to hold the electrode in place very satisfactorily by tying with silk, so that the cases in which it is necessary to hold the electrode in the hand, which were formerly very trying, are now seldom encountered.

I refer here only to operations in tooth-cavities,—it being usually necessary, in operating upon soft tissue, to hold the electrode in the hand; these applications are of such short duration, however, that this is attended by little or no inconvenience.

Regarding the cataphoric anesthesia of sensitive dentin and exposed pulps, I have but a word to say in passing.

Not, as I have said before, that I underestimate the value of this branch of practice, but rather that others have already said all that I could say about it, and have said it much better than I could do. To one point in this connection which I have found of value, I will, however, call your attention. This consists of the use of warm anesthetic solutions. Knowing the advantages to be derived from their use to effect local anesthesia by hypodermic injection, I applied the same in cases of sensitive dentin with satisfactory results. A solution of cocain is freshly prepared for each case, and is heated almost to the boiling point. This serves to sterilize the solution, and besides obviating the pain caused by cold applications in sensitive cavities, the anesthetic action seems to be hastened and its effect prolonged.

A further advantage is to be derived in these cases from the use of saline solutions of cocain, as they are conveyed by the electric current more rapidly into the tissues than are ordinary aqueous solutions. For this reason the solution of cocain in electrozone, known as electrocain, is of value, though an equally good result may be obtained by dissolving cocain in a ten per cent. solution of sodium chlorid. The salt solution should also be used to moisten the dispersing electrode, and concerning the position of this electrode a word in this place may not be amiss.

It should always, in my opinion, be placed in contact with the palm of the patient's hand, and should present as large a contact surface as possible. The resistance to the current is thus reduced, and the danger of blistering the skin, which is always present when the electrode is placed upon the wrist or the face, is overcome.

An invaluable application of the electric current is that of lining root-canals with silver nitrate, as introduced by Dr. Bethel.

Too much cannot be said in praise of this method, for, while it can be used only in teeth that are hidden from view, it offers, in those cases in which it is applicable, an absolutely certain means of overcoming conditions which have long been most perplexing.

Dr. Bethel's method, as already described by him, is to apply the rubber-dam, thoroughly dry the cavity and canals, and then to work into each canal a drop or two of a saturated aqueous solution of silver nitrate. The current is then applied, using the positive pole and a strength of ten to fifteen cells, continued for five minutes, which will give an average of about one-half milliampere. The time mentioned is sufficient to deposit in the canals and tubuli an insoluble compound of silver, and is yet too short to allow a penetration of the solution into the soft tissues.

It is, of course, desirable when possible that the canals shall be thoroughly cleansed of their contents before the silver nitrate is applied, but I am free to admit that I, at least, encounter occasionally a canal so constricted, or so tortuous, or so difficult of access that it is beyond my ability to open it thoroughly to the apex and remove every particle of pulp-tissue.

And it is in just such cases that this method proves its usefulness, for it matters not what the condition of the canal may be, it is rendered by this treatment absolutely and permanently sterile and aseptic. The treatment is thorough, effective, and truly scientific, and but one objection to it can be made, namely, the discoloration of tooth-substance by the silver nitrate.

Dr. Bethel's suggestion for avoiding this is to protect the walls of the cavity with a coating of paraffin, and I have found that a further good result may be obtained by following the treatment with an application of iodin with the current. This will remove the silver nitrate stain, and can in turn be very readily removed by means of ammonia.

In cases of roots that are to be covered by crowns or bridges, this discoloration is of no consequence, and it has become my practice to subject nearly all such roots to this treatment.

As a practical example of the utility of the method under consideration, the following case may be of interest: An upper third molar presenting a distal cavity with a putrescent pulp, the palatal canal was readily opened and cleansed with sulfuric acid, but the buccal canals were of such a character as to render free access to them impossible. An antiseptic dressing was made, and the patient was dismissed, only to return the next day suffering intense pain. All of the ordinary methods of treatment—antiseptic dressings, topical applications, and systemic remedies—were resorted to without effect. The pain steadily increased for three days, causing serious loss of sleep, and becoming almost unbearable. I had at that time just learned of Dr. Bethel's method, and decided to apply it in this case. The application was made, as described, and in four hours the pain had entirely ceased. A few days later the cavity and palatal canal were filled without further regard to the buccal canals, and there has been not the slightest recurrence of pain up to this writing. That was nearly a year ago, and since that time I have treated many similar cases in the same way, and always with gratifying results.

It is frequently desirable to thoroughly sterilize root-canals, and at the same time imprudent to use the silver nitrate, owing to its staining properties,—as, for example, in anterior teeth,—for, while, as I have said, it is possible to remove a portion and in some cases all of the stain, the results are as yet too uncertain to justify the risk in teeth exposed to view.

In these cases most excellent results can be obtained by the use of some antiseptic solution,—pyrozone, hydrogen dioxid, hydronaphthol, or almost any other which possesses the requisite conductivity. The solution is introduced into the canal on cotton, and the current applied in the usual way.

This affords also an efficient means of sterilizing infected soft tissues in the apical region, and many an incipient abscess has by this means been aborted. The soluble metallic electrode offers still another means of sterilizing not only canals, but abscess cavities and pyorrhea pockets. It was introduced to the profession by Dr. Wm. J. Morton, of New York, and consists of an elongated bulb, usually of zinc, though other metals are in use by the medical profession. This zinc bulb is mounted upon an insulated handle and inserted into the cavity. The action of the current is an electrolysis of the metal and a generation of zinc chlorid, which is conveyed into the tissues.

An important modification of this method has been made by Dr. Geo. B. Massey, an electro-therapist of Philadelphia, who suggests that the zinc electrode be coated with mercury, the result being a generation and deposition of the chlorid of both mercury and zinc.

In small root-canals where it is almost impossible to find zinc wire small enough to penetrate, a fine gold wire coated with mercury may be used, the mercury alone being acted upon by the current. These applications may be made with almost scientific accuracy as regards time and strength of current, a very little experience serving to demonstrate the length of time and amount of current necessary to dissolve a certain amount of the metal under certain known conditions.

In peridental inflammations, acute or chronic, the cataphoric current has been, to me, of greater value than in any other class of cases. We are all too familiar with these cases in which an acute and persistent pericementitis always follows operations of any length, and with these chronic cases of long standing that develop severe inflammations upon the slightest provocation and at the most inconvenient times, and also with that especially troublesome class of devitalized teeth in which it is impossible to keep a filling for more than a short time without causing discomfort and suffering to the patient. It is true that many of these cases are readily amenable to ordinary treatment, but it is equally true, also, that many of them resist all our efforts in the way of topical applications and systemic treatment, and it is here that the electric current is of the greatest and most indispensable assistance.

To a saturated solution of potassium iodid is added about one-fifth its quantity of a mixture of equal parts of the tinctures of iodin and aconite. A pledget of cotton is saturated with this preparation and applied, by means of the rubber cup electrode, to the inflamed gum. About one milliampere of a ten-cell current will be found sufficient, and should be continued not longer than five minutes. In most cases this one application is all that is necessary to reduce the inflammation, the pain quickly subsides, and there is seldom a recurrence of the disorder.

During the past winter two cases came under my attention which possessed many points of similarity, and which serve very well to illustrate the foregoing application. Both were ladies of about the same age and of highly nervous temperaments, and both were under my treatment for the first time. In each case I was informed that previous dental operations had invariably been followed by severe inflammation, and in one of them the devitalization of a pulp had always resulted in an abscess and the ultimate loss of the tooth, several teeth having been lost in this way. As neither patient had received any dental treatment for some years, there was naturally a serious condition of affairs encountered, and it was necessary in both cases to devitalize one or more pulps. These operations were immediately followed by severe and extensive inflammation, with most intense suffering, which obstinately resisted all treatment until the application just described was resorted to. Two applications were necessary in each case, but were followed by a disappearance of the symptoms, and their treatment was carried to a successful conclusion.

The value of this method of treating peridental inflammations lies chiefly in the fact that, in very many cases, it succeeds where all others have failed.

Various combinations of the methods herein described will readily suggest themselves, and will be found of great value in many cases.

In conclusion, gentlemen, I thank you for the privilege you have accorded me of bringing this subject before you, and my plea is for a more thorough understanding and a more scientific application of the principles of electro-therapeutics in dental practice.

MOUTHS IN WHICH DENTAL CARIES PERSISTS.

BY OTTO E. INGLIS, D.D.S., PHILADELPHIA, PA.

(Read before the Pennsylvania State Dental Society, July 12, 1898.)

CONSIDERABLE scientific work has been done to determine the cause of dental caries, and it is generally conceded that the works of Miller and Williams have positively demonstrated the causal relation existing between mouth-bacteria and caries of the enamel. Miller has shown how caries progresses in the dentin. Black states that clinically he has noted differences of action between teeth under cutting instruments,—*i.e.*, he has noted the superior density or better molecular arrangement of the elements of some teeth, though he denies this to be a protection against caries.

Williams has shown us the poor structure of the enamel of syphilitic teeth. Differences between the enamel of the teeth of different patients are readily noticeable with the naked eye. The predisposing causes of dental caries are general and local.

As general predisposing causes may be grouped all influences or diseases which either lessen the inhibitive forces naturally existent in the oral cavity, or induce in the patient an indifference to oral hygiene. It is quite possible that the demand for phagocytosis in other parts (as, for instance, in tuberculosis) may lessen the number of phagocytes in the oral mucous membrane, or that some vital resistant principle resident in the saliva may be lessened in quantity, as has been suggested by Black. The composition of the saliva may be altered in disease. The local predisposing causes are faulty structure, form, and arrangement of the teeth, loosened gum-margins or pockets, and imperfect hygiene.

Of form and arrangement I shall say nothing. Their relation to dental caries is thoroughly understood. Structure, however, is much discussed at the present time. Writers upon temperaments all clearly indicate macroscopic differences of structure of the enamel and of the form of teeth. These vary from the yellowish, translucent, well-formed, dense-looking teeth of the bilio-sanguine temperament to the muddy-yellow-opaque, ill-formed, brittle, and easily cut teeth of the bilio-lymphatic temperament. The differences between these two temperaments are by no means confined to the enamel or shapes of the teeth, but appear in the hair, eyes, skin, features, and figure, and I doubt not that the difference could be noted in the individual cells of any part were we but able to make the distinction. Even upon casual examination of teeth it is to be noted that there are apparent differences in the structure of the enamel of different patients, and I have often noted in clinical service naturally rough enamel, and in such cases caries was prevalent in the mouth.

Oral hygiene speaks for itself; though an unclean tooth may not decay, a clean one will not. To recapitulate, arrangement and form are to be considered in their relation to the retention of fermentable substances in situations favoring circumscribed or diffused caries, both primary and secondary. Structure is to be considered first, as inert enamel decalcified easily or with difficulty, or not at all by equally potent causes; second, as resistant or non-resistant dentin. The vital resistance upon the part of the dentin is practically nil, as it is almost invariably overcome. The enamel once decalcified, the destruction of the tooth is usually but a question of time.

Miller has settled the fact that lactic acid produced by fermentation of carbohydrates causes the decalcification of enamel and dentin, and while it must be granted that the exciting causes of caries are micro-organisms, we are interested in the query, Why does caries seem to persist in some mouths to an extent sorely trying to the patience of operators? Why do some patients require few operations after a large line of work has been done, and why do some require an undue number of fillings at each semi-annual or annual visit? I have had in my practice two especially marked cases of rapid onset of caries. The first was that of a young lady of perhaps twenty-two years of age. At her request I made an examination of her teeth. Three small cavities were found and filled. That was in February, 1895. In March, 1896, she reappeared with twenty-six cavities in her teeth, many of them dangerously near the pulp. Inquiry elicited the fact that she had been taking tincture of ferric chlorid in a prescription without subsequent use of an antacid wash. I filled the teeth and indicated the use of an alkaline wash after the medicine, and the rapid inroads upon the teeth ceased.

In this case there can be no doubt of the influence of the acid upon the production of caries. The effect upon the teeth was not to destroy the smooth buccal or lingual surfaces, but the cavities were located as they ordinarily would be. Undoubtedly the acid had penetrated the dental interspaces, where it found time to act, while the exposed surfaces were cleansed by the tongue and cheek. The enamel once decalcified, it is probable that caries proceeded from the usual causes. The same effect may be attributed to the acid eructations of pregnancy and sea-sickness. The second case which I wish to cite is that of a child two and a half years old in 1895. I filled three small fissure cavities, and complimented the mother upon the condition of the denture. Eighteen months later the child was brought to me with twenty approximal cavities well established. These appeared like simple decalcifications of enamel and dentin, the form of the dentin in many cases being retained. The color was a light yellow. The mother informed me that since I had seen the child it had developed a great desire for candy, which the father, being indulgent, would frequently bring home.

This last case excited in my mind a thought that the production of lactic acid in the mouth was a more rapid process than is generally supposed. Miller in his extra-oral experiments gives the impression that the production of lactic acid is a process requiring several hours. I have frequently noticed, however, that after eating anything sweet the original sweet taste was shortly succeeded by a peculiarly disagreeable one. When well established this slightly suggested an acid. I further found that the length of time for this change to take place and become marked was quite constant. To determine if this were due to fermentation, a series of experiments was instituted, which I shall detail.

Test 1. Twenty minutes after each meal at which carbohydrates were eaten my mouth was tested with litmus paper, and usually found to be acid upon the buccal mucous membrane at the reflections, upon the dorsum of the tongue, and the middle of the soft palate, but not upon the anterior portion of the tongue. Certain spaces between posterior teeth gave an acid reaction, as did a large cavity of decay in a third molar.

Test 2. Upon rising I tested my mouth and found it acid. I then brushed my teeth, using carbolic acid soap and ordinary care. I found some acid still present upon the buccal mucous membrane, near the lower third molar. To remove all acid I rinsed with a strong solution of sodium bicarbonate, and then rinsed again with water. The mouth was now neutral or alkaline. I now thoroughly chewed a piece of dry bread, and allowed the last few particles to collect in various parts of the mouth. In ten minutes the middle of the soft palate was slightly acid, the other localities neutral. (For reasons hereafter to be shown, this acid upon the palate has small significance here.) The reaction of the bread moistened with water was acid, but after introduction into the mouth and mixture with alkaline saliva it was found to no longer react acid. At the end of twenty minutes an acid reaction was found in all the food masses, whether in the cavity of decay, between the teeth, or under the upper lip. The time required would seem to be the time necessary for the organisms to develop. The saliva would seem to have no antiseptic quality aside from its neutralizing alkalinity, for in this test it was freely mixed with the bread.

Test 3. This test was made upon the same lines as No. 2, a chocolate cream being substituted for the bread. The result was the same.

Test 4. I brushed my teeth with extraordinary care, and passed floss silk through all interspaces. I was somewhat surprised at the effectiveness of the brushing given, as scarcely any material was removed with the silk. Following this, I sterilized my mouth with a 1-200 solution of potassium permanganate. Three two-minute baths were given at intervals of ten minutes each. Following this I rinsed with sodium bicarbonate in previously boiled water. Examination of the mouth demonstrated a deposition of manganic oxid in all parts of the mucous membrane, and even the teeth and deposits thereon were stained. It was found that the region of the dorsum of the tongue occupied by the circumvallate papillæ was not stained. Unsterilized sugar was now introduced into the mouth and constantly renewed. One hour and fifty minutes elapsed before any acid reaction could be detected at any point except at the circumvallate papillæ. Even here it was much retarded. The sugar was left unsterilized because of the fact that it would be of advantage to know the effect of antisepsis upon unsterilized materials which are of daily use. We are forced to conclude that the elimination of bacteria from the mouth threw the burden of acid formation upon the organisms attached to the lumps of sugar, and that they were able to eventually overcome the conditions unfavorable to their growth. The production of acid was but slight. The mouth was allowed to remain as it was until the next morning (eight hours later), and, when tested, was found almost neutral, proving that with the disappearance of the fermentable substance by solution fermentation had ceased. The mouth still exhibited the effect of the potassium permanganate. Sugar taken at this time required considerably more time than usual to react acid. This shows that asepsis was almost perfectly maintained during the night, or else that manganic oxid has an inhibitory effect which is reasonably lasting.

Test 5. After eating a meal the teeth were left unbrushed for two hours. The mouth was rinsed with sodium bicarbonate and given a three-minute lavage with potassium permanganate. Sugar was kept in the mouth as a test. No acid was produced except in the dental interspaces and in the region of the soft palate. The explanation of this seems to be that the antiseptic did not penetrate the food masses in the dental interspaces, and that, because of the compression of the tongue against the soft palate in the act of rinsing the mouth, that part was not sterilized.

Test 6. To determine whether the acid formed might not be due to an acid reaction of the secretion of the mucous follicles, I rinsed my mouth with sodium bicarbonate solution, and then with water. The mucous membrane of the soft palate and the upper lip was then dried. When the exudations from the glands were sufficient in quantity, they were tested and found to be alkaline.

I think we may safely deduce from these facts that the fermentation of carbohydrates is proceeding with considerable constancy at all hours of the day, and that no advice upon the care of the teeth is sound that does not insist upon the teeth being brushed after each meal. The fermentation of carbohydrates in protected places afforded by projecting or depressed edges of metal or zinc phosphate fillings or roughened and swollen surfaces of gutta-percha fillings seems to account for much perpetuation of caries, which fact supports the argument of Black that badly carious teeth demand our best efforts in the attempt to obliterate it as far as possible by carefully finished work carried out upon correct principles. Cavities of decay are to be regarded as sources of infection. While caries is not primarily dependent upon the structure of the teeth except in so far as opportunity for lodgment of organisms is afforded, the rapidity of its progress is in direct proportion to the poor quality of organization of the tooth-structure, the potency of the causes being equal. An abnormal quantity of organic matter in the saliva or the coagulation of the albuminous elements by lactic acid already existent in the mouth may stand in causal relation to rapidity and distribution of caries. Clinically it is noticed that badly carious teeth are usually associated with stringy saliva. While the fact is known that albuminous substances ferment with alkaline reaction, it may be fairly argued that saliva which contains fermenting albuminous matters is in a condition to act rapidly upon carbohydrates introduced into the mouth.

Williams has cited a case in which streptococci were found in great numbers in a mouth in which caries was prevalent. As these organisms will grow either in albuminous or carbohydrate media, it is not impossible that they may cause rapid transformation of carbohydrates into lactic acid. Caries may be regarded as in the main a disease of the posterior teeth, which, when well established, infects in turn the anterior teeth. Its cure lies in perfect filling, and in the maintenance of perfect cleanliness, in which antiseptics are useful adjuncts. Any departure from this rigid rule will be likely to result in a corresponding amount of dental caries.

THE RESTORATION OF BADLY DECAYED OR BROKEN TEETH BY GOLD FILLINGS MADE OUTSIDE THE MOUTH.

BY WM. EDWIN PERRETT, DENTIST, VALPARAISO, CHILE.

PROBABLY no class of operations that the dentist is called on to perform necessitates so much time, energy, and work as the restoration by gold fillings of badly decayed or broken teeth in the mouth. Every dentist who has had to build down with gold one-half or two-thirds of a tooth knows the exhaustion and feeling of utter weariness experienced on the completion of the operation, aside from the feelings of the patient, which are seldom taken into consideration. It is all very well to talk about the esthetic, barbarous, etc., side of such operations, and suggest porcelain crowns, or restoration with porcelain fillings; our patients come to us with the idea of gold, and generally will be satisfied with nothing else.

The simple mention of porcelain conveys to the lay mind a suggestion of something fragile, easily broken, or of short duration; and all our assurances to the contrary are received with but little faith. Any method that will make these operations easier to both patient and operator I believe will be accepted by the profession, and, if found feasible, given a trial.

After having put the tooth in a proper state to receive the filling, carefully bevel off all edges of the enamel as flat as possible, also weak places not of necessity broken down, as there is no hammering to be done on the tooth; fit a gold screw loosely to the root-canal, allowing sufficient to project to come to the edge of filling when completed. Take a small piece of hard wax, warm and mold over end of screw to proper contour, just as you want your gold filling to be on completion. Cool with water to harden, loosen, remove, and correct any irregularities noted; care must be taken to get a perfect impression of the borders of the enamel in the wax, as on this depends the success of the operation. If correct, return to tooth, and take an impression in plaster with plug *in situ;* if the plug does not come away with the impression, it should be carefully removed and put in its proper position in the impression. The gold screw that projects from the wax should then be heavily varnished, or a thin film of wax run on it, to prevent its amalgamation, and also to facilitate its removal after the filling has been made. S. S. White copper amalgam is then prepared to the condition known as "buttery," the impression filled with it and set aside to harden for twenty-four hours or more.

The impression may then be opened, the wax removed, the model cemented or fastened to anything easily held in the jaws of a vise, and the filling built down over the gold screw that projects from the amalgam. Retaining pits may also be drilled, if thought necessary. After the filling is made, by carefully warming it can be removed from the model intact, taken to the chair, and be cemented to the tooth in the mouth. If very little hammering is done at the commencement of the filling, the edges will come away from the amalgam model sharply defined.

There should be no polishing done on the model, to prevent discoloration. This should be done in the mouth after the cement has hardened, but another sitting is preferable for the final finish and polish.

CORRESPONDENCE.

"THE INNERVATION OF THE TOOTH-PULP."

To the Editor of the Dental Cosmos:

Sir,—As one of the workers at the histology of the dental pulp referred to by Dr. Huber in his paper with the above title *(vide* Dental Cosmos, pp. 797-810, vol. xl), I beg to thank him for so clearly setting forth his views on the termination of the nerves in that organ, and for so fully describing the methylen-blue method for the benefit of microscopists.

It is now five years since I gave great attention to the investigation of the cellular elements of the pulp, my efforts more recently having been confined to its morbid conditions. In 1893 my observations were made on the teeth of man, chiefly sound cuspids which had been removed for regulation purposes. Sections of the pulp were cut *in situ,* this plan seeming to me to be more likely to yield truer results than mere isolated tissues. On these my deductions were based.

While admiring immensely Dr. Huber's energy and skill in the preparation of his specimens, I must confess that I should have felt more satisfied with his references if he had employed the teeth of man, and applied to them those decalcifying processes which retain the soft parts in close approximation to the hard. For herein lies the gist of the whole matter, in my opinion.

In his figures he omits the distal poles of the odontoblasts, and ignores entirely their basal processes. In what way, does he consider, do the free extremities of the latter terminate?

With regard to my paper (*Trans. Odontological Society of Great Britain*, November, 1893), the only argument which he controverts (p. 800)—viz, the analogy of the odontoblasts to certain cells—is the weakest of the series which I adduced, and appears last in the list. Of course it does not require too much stress-laying upon it, although a distinct *histological* similarity does really exist.

One would have expected that Dr. Huber would have found, rendered prominent, the basal layer of Weil in his sections after staining for nerves,—*if it is a net-work of nerves*,—and therefore been able to reproduce it in his drawings. This he has not done. But the question arises, Does it exist in the pulps of the rabbit? And can it be conceived that the lower animals are capable of experiencing similar exalted types of dental pain to ourselves? These are points which I have not investigated.

Let me hasten, however, to assure the essayist that not for a moment do I doubt the accuracy of his researches. Still I certainly think that if he would, as a control experiment, apply his staining principles to sections of teeth of man prepared as I have already indicated, he would perhaps discover that the ultimate ramifications of the non-medullated nerves occupy a different position on the periphery of the pulp to that ascribed to them in his paper.

In the first quotation from my paper (p. 801), the words "basal *cells* of the odontoblasts" should read "basal *ends*." Obviously this is a printer's error.

I am yours faithfully,

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PROCEEDINGS OF SOCIETIES.

TRI-STATE DENTAL MEETING OF THE MICHIGAN, INDIANA, AND OHIO DENTAL ASSOCIATIONS.

(Continued from page 855, vol. xl.)

The evening session of the first day was devoted to a lecture by Professor W. C. Barrett, of the Buffalo Dental School.

Dr. Barrett's lecture dealt with the evolution and function of teeth, their physiology and pathology. Especial emphasis was placed upon the researches of Professor W. D. Miller in the domain of dental caries. The lecture was fully illustrated by means of the projecting lantern, and was highly instructive.

Second Day.

The convention was called to order by Dr. S. B. Hartman, president of the Indiana State Dental Association.

On motion of Dr. Loeffler, seconded by Dr. Taft, a vote of thanks was extended to Dr. W. C. Barrett for his excellent lecture of last evening.

The CHAIRMAN. We will now open the discussion of Dr. Barrett's lecture of last evening. The discussion will be opened by Dr. J. Taft, of Ann Arbor, Mich.

Dr. TAFT. I have simply this suggestion to make: Time is going very rapidly and this program is being reached very slowly, and I suggest that we proceed to the next order of business on that account, and for another reason, that Dr. Barrett's lecture so very fully covered the ground. There may be points on which persons may differ, but there is no time to enter upon a proper discussion, for a proper discussion of this paper would occupy two or three hours, and I suggest that this subject be passed and that we take up the next order of business. I will make that as a motion.

Dr. HUNT. I second the motion.

The motion was unanimously adopted.

The following paper was read by Dr. GEO. W. COOK, of Chicago, Ill.:

THE EFFECT OF HEAT ON DENTIN.

The effect of heat on cell life, and especially micro-organic life, has been studied by many investigators. Toussaint was the first to take up the subject. He found by keeping blood containing anthrax bacilli at a temperature of 55° C., that while the bacilli were not killed, they were rendered harmless. Pasteur took up the experiment on a large scale, employing a considerably lower degree of heat, but he did not give full particulars of his method, so that no definite judgment can be formed regarding it. We therefore owe our thanks to Koch and his coadjutors, who once more approached the subject in a methodical and strictly scientific manner with a view to ascertaining the effect of heat on bacterial life. The anthrax was employed because of its greater resisting power. Koch, Gaffky, and Loeffler found that at 42° C. the virulence was perceptibly diminished. It was further discovered that the lower the temperature at which diminution would take place, the longer time it took, but the more permanent were its effects.

It was found that the variation of a fraction of a degree was of importance. The anthrax bacilli can be rendered perfectly harmless in nine days at 43° C., but it requires twenty-four days if only 42.6° C. are used, and they never return to their pathogenic state, or at least not for a long time.

On these facts I began a series of investigations as to how much heat could be used in a tooth. Here I found three factors to be taken into consideration,—viz, the effect of heat on bacteria, the amount of moisture extracted, and the effect on dentin. The first of these is of the greatest importance. As has been shown in the foregoing remarks, a temperature only 6° above the body temperature will render micro-organisms harmless. As has been stated elsewhere, I found that 90° C. in most all cases kill bacteria in pulp-canals, the heat being applied for ten minutes by means of a root-canal drier; but after a number of experiments at various degrees of heat, I found it took about 130° C., in three applications of four and a half minutes each. When a course of this treatment was carefully followed, I could not in any case get a culture from the pulp-canal; but, as has already been shown, a course of treatment of this kind necessarily causes the loss of moisture, and just what the effect of such a loss on tooth-structure will be is a question. Dr. Black has stated that he considers that free water is an essential element in tooth-structure. Just what Dr. Black meant by the statement is hard to tell. Any element in tooth-structure cannot be considered free. If water is an element in the structure of dentin it must be in the form of water of crystallization, and as none of the inorganic matter which makes up the hard part of the dentin requires water for crystallization, it is not proper to say that water is an element in tooth-structure at all. Of course, all living tissue contains more or less water. But water as water does not enter into the chemical constitution of the molecules, but is simply held by imbibition,—*i.e.*, the power of all colloid substance to imbibe (take up) a certain amount of water, which causes them to swell up and keep their shape as well as their toughness and flexibility (not easily broken). It might truly be stated that the function of water in all bony tissue, in so far as its resistance is concerned, is to keep the colloid material in an elastic, tough condition, as opposed to the brittle, non-elastic condition of dry fibrous tissue. So it is readily seen that while water is not an element in tooth-structure at all, its presence is necessary for the normal elasticity and toughness of the tooth-tissue.

As the greater part of the tooth is composed of dentin, a few words concerning its structure and chemistry will not be out of place here. According to Berzelius and Bebra, dentin consists of twenty-eight parts animal matter and seventy-two parts inorganic or earthy matter. The animal matter consists of colloids, which are converted into gelatin by boiling. The inorganic matter consists of $CaCo_2$ Ca_3 $(PO_4)_2$, Mg_3 $(PO_4)_2$, and traces of other inorganic salts. As none of the salts require the presence of water for the formation of their crystalline form, none of the moisture found in the tooth-substance can be considered water of crystallization. Also, as none of the inorganic salts are affected at all by a temperature less than 800° C., at which temperature the $CaCo_3$ passes into CaO_2, we must attribute all effects of a temperature of from 90° to 130° C. to its action on the organic substance, of which there is about twenty-eight per cent.

As already stated, the organic matter consists of colloids which form a sort of matrix or base by which the inorganic salts are held together, thus forming a hard and to a degree elastic and flexible body.

It is well known that all colloid substances take up a certain per cent. of water by imbibition, and their elasticity and flexibility are largely due to this property. On the other hand, if the water is driven off by heat or otherwise, a shrinking follows, and instead of being elastic and flexible they become brittle and inelastic.

From these facts the brittleness of old dry teeth or teeth which have been subjected to a degree of heat sufficient to drive off water can be explained. Although it is hard to make out any contraction in the dentin or separation of it from the enamel, yet it is a well-proven fact that after drying the enamel is easily broken off from the dentin and the whole tooth-structure rendered more brittle. This can only be explained by assuming that the water held mechanically by the colloid matrix of the tooth has been driven off, thus rendering the organic structure brittle and non-elastic.

From the above, the function of the water as regulating the integrity of the tooth is evident, as well as the effect of driving off the water upon the elasticity and flexibility of the tooth.

In noting the effect of a temperature of 125° C., for ten minutes, on thin sections (1-100th in.) of dentin and enamel, I was unable to corroborate Black's statement that such treatment caused a contraction of the dentin, thus separating it from the enamel, which would easily break away from the dentin. In my experiments I could detect no such contraction or separation of the dentin from the enamel. The only effect was the sections were more easily broken, and the dentin was more porous, the tubule being empty and more perceptible. But it must be remembered that Black subjected his sections of teeth to a temperature of 200° F. for twelve hours, and found a contraction of the dentin, while I could detect no such contraction after a temperature of 125° C. for twenty minutes.

From these facts it is possible to determine approximately the effect of a temperature sufficient to kill bacteria on the tooth-structure in from ten to twenty minutes. In a number of experiments I found that the application of a temperature of 130° C. by means of the root-drier was sufficient to destroy bacteria in pulp-canals in three applications of four and a half minutes each. Such treatment gradually reduced the weight of the tooth from 0.65 to 1 per cent., the loss being due to the extracting of water. While such an application of heat aids very materially in the destruction of bacteria and in rendering the pulp-canal aseptic, the question concerning its action on the resisting power of the tooth-structure must be taken into consideration. As already stated, such a degree of heat has no chemical effect whatever on the inorganic salts which enter into the earthy or hard structure of the tooth. Also it might be stated that in experimenting on the resisting powers of teeth toward pressure, both before and after the use of heat in the manner already described, I could detect no difference in the resistance; and, further, I will say that the results of my experiments in this line correspond very closely with those of Dr. Black. These experiments indicate that the resistance of the tooth-structure is unimpaired by the use of the root-drier; but the experiments on their sections of tooth-structure show that they are rendered more brittle by a temperature of 130° C. for ten minutes. It must be remembered that there is a great difference both in the manner of application of the heat and in the form of the material acted upon.

In the first case a comparatively large mass of substance is acted upon and only a comparatively small per cent. of the moisture is driven off, while in the second case a comparatively small mass is acted upon and a very large per cent. of the moisture is driven off, sufficient to render the colloid substance hard and brittle.

In conclusion, I will say that after one has removed by mechanical means all the *débris* from the pulp-canal, the application of the root-drier at a temperature of about 90° to 130° C. for a very few minutes would not be out of place. But if the temperature be raised to where you get the hissing sound with the root-drier, which is 170° C., there will be a drying out of the organic substance, thus rendering the tooth more brittle.

I am indebted to Dr. S. A. Matthews, Mr. Slimmer, and Mr. C. A. Francies, of the Chicago University, for assistance in this work.

Discussion.

Dr. H. C. KAHLO, of Indianapolis. The essayist has given us an interesting and entertaining paper, one which is the result of a great deal of experimentation and careful research. While I do not concur in all of his views upon the subject, I heartily congratulate him, and all others who, by their efforts, furnish us with a knowledge pertaining to dentistry which it has not been our pleasure or good fortune to acquire for ourselves.

The fact that most of his experiments were made upon teeth out of the mouth necessarily limits the practical value of his investigations, since the conditions present in teeth in and out of the mouth are in some respects so vastly different.

The first point to which I desire to refer is the presence of water in tooth-structure. In this I am obliged to side with Dr. Black in the assertion that water exists as "free water." If such were not the case, how could we explain or otherwise account for the fact that after driving it from a tooth within the mouth by means of the application of heat but a short time elapses until it has returned in its natural physiological proportion?

Dr. Cook states that the presence of water is necessary to the elasticity and toughness which normal teeth present. This is undoubtedly true, and, since its presence is as constant and its function as distinct as the other elements which go to form a tooth, I see no reason why it should not be classed as an element in tooth-structure along with the other organic and inorganic elements known to be contained therein.

While the doctor has given us some interesting figures relative to the amount of heat necessary to produce changes in tooth-structure, he has only proven to us that the amount of heat which we are able to produce in a tooth while in the mouth would practically only drive out the water contained within it, and possibly destroy the micro-organisms which lie in the pulp-canals.

In his concluding statement he says it took "a temperature of 130° C., three applications of four and a half minutes each," to bring about the certain destruction of all micro-organisms, and that by raising the temperature to 170° C. a hissing sound is produced from the root-drier. This latter degree of heat, in his judgment, would so dry out the tooth that it would cause it to be brittle.

I should be glad to know how the doctor measures the temperature of his root-drier, also whether or not you can cause a tooth to become equally dry by a lower temperature, provided the length of application is increased. It has always seemed to me that it would be impossible to do any permanent injury to a tooth from the amount of heat which a patient will tolerate in the use of a root-drier.

Dr. TAFT. Mr. Chairman, this paper is an excellent one, it seems to me, but it raises certain questions that are not conclusively decided by the paper. In reference to the presence of free water in dentin, I understood the essayist to say that all water in tooth-structure was never combined with other elements. I do not think that is true. If it were true, organisms or bacteria would not proliferate, grow, and live in dentin. If it were true, there would necessarily be decomposition before you could remove water from the dentin itself. But it is found by thoroughly drying the tooth out of the mouth, taking a fresh tooth and drying it thoroughly, its weight is somewhat reduced, indicating that there was a removal of some material, and no material is so readily removed as the water in it; and we can hardly imagine that a moderate degree of heat as would be sufficient for the purpose would break up the combination of water with other materials. The water of crystallization cannot be so readily removed as this. So that, as in all other tissues of the body, undoubtedly there is a large amount of water that is not in combination with any other material. Now, as to the removal of this in an operation, perhaps there are two reasons, one might say, why it is necessary to remove moisture from the canal or pulp-chamber in filling. One reason is, moisture ought not to be permitted to remain in a cavity that is to be filled, because it would render a filling less perfect than it would otherwise be. But what degree of desiccation should be effected? Shall there be a thorough drying of the dentin in any considerable distance from the surface, or is it not sufficient to simply remove the water from the surface of the canal? That seems to be all that is necessary, and all that should be done. Persons sometimes are induced or urged to use a drier of hot air until the dentin assumes a chalk-like whiteness, indicating that the water has about all been removed from the surface of the dentin, and some distance within, because a superficial removal would not bring about that chalk-like whiteness. When that occurs it indicates that the desiccation has penetrated some distance in the dentin. That I can see would be detrimental to the tooth. After all, the intimation in the paper is that by this thorough drying it is likely to render the tooth subject to fracture. I cannot conceive that would be the result at all by thorough desiccation,—such desiccation as could be made by very hot air or by root-drier even, because there is no force there to make a fracture at all. So that does not enter into the matter as an important question. Another object for thorough desiccation is, if there are bacteria in the mouths of the tubuli it would be adverse to them to make a thorough desiccation, and so that is an argument in favor of the thorough drying. Organisms cannot proliferate, cannot grow, can hardly exist in any structure, in any place that is entirely free from water. They must have moisture in which to thrive. And the removal of this from the surface, from the walls of the cavity as far as possible, and into the dentin as far as possible, would be beneficial in this direction. That much for the thorough desiccation of the walls of cavities, pulp-chambers, and canals everywhere.

This paper I look upon as a valuable one as calling forth suggestions in reference to this matter, raising questions that every one must decide for himself, and it seems to me that a thorough consideration of the subject would lead one to about a correct conclusion in regard to the matter, so far as it affects ordinary practice, and that is all we are aiming at. Science that does not reach the ordinary practice in any way, either directly or collaterally, is of very little benefit, except so far as it may be a satisfaction. I desire to have all these questions decided upon their merits, not only scientifically, but so far as they reach and modify practice; that is the aim, to enable us to do better the things we attempt to do in the work of life. That is the ultimate object at which we aim, and not our mere gratification at having accomplished a scientific work that would have no bearing upon practice whatever. This paper is a valuable one, because it does lead to practice, and it leads to truth, it leads to very practical points and very important and interesting ones also.

Dr. HARVEY, of Battle Creek, Mich. Mr. Chairman, I would like to ask Dr. Cook what was the maximum temperature of the heat as applied to the experiments upon these various teeth.

Dr. COOK. To go into detail of all this work of experimentation would require hours. I carried the temperature in a number of cases to 200° C.; but if the temperature is carried to 200° C., there is a perceptible contraction in the dental fiber. There is more of a contraction in the direction toward the periphery, from the center. Dr. G. V. Black has stated the contraction takes place between the dentin and the enamel, and, therefore, in giving this I have simply brought out some of the points that I had arrived at in regard to the experimental work done in these teeth. I did not feel that I could burden the society with all the details in the matter, but if any one would like to ask a question I would be glad to go into the subject in this way. The temperature, I think, if carried to 170° C. for ten minutes, will cause a contraction or weakening of the tooth. In testing teeth through pressure, I started with two lower bicuspids in perfect condition. They were extracted in the clinic for other purposes, and I took those teeth and put them in the incubator, kept them as nearly as possible to the body temperature, and in the moisture of saliva. One of those teeth I tried at 170° C., and applied the pressure as Dr. Black has done in his experimental work on these teeth. The one that had been subjected to 170° C. broke at two hundred pounds' pressure. The one that had not, we put on three hundred and twenty-five pounds of pressure, showing the one that had been dried out, and as nearly as possible under the same conditions, out of the same mouth, showed there was a weakening in the tooth. But those we had been experimenting on at a temperature of 130° C. only, I detected no difference in the pressure whatever. I could determine no difference in the contraction of the dentin, and, as I stated in my paper, the only thing, the tubules were cleared out a little more at the temperature of 120° C., showing the moisture had been extracted, making the tubules a little larger, if anything. Dr. Kahlo spoke of the experimental work done outside of the mouth. Of course, we know that is done under a great disadvantage. The experiments out of the mouth are not always as good as we would like to have them. These teeth were furnished me, fresh from the mouth, by a gentleman who was extracting teeth, and I immediately put them in the incubator and kept them at the body temperature, and as nearly as possible under normal conditions, and after those teeth were dried out there was seemingly no difference in resisting power from those that were extracted, taken from the mouth, and put under the same pressure, and those that were subjected to the treatment as the paper stated. I hope that some time I shall be able to give in detail all the facts connected with this experimental work, and apparatus used. The conductor of physical experiments in the Chicago University Physical Laboratory made an apparatus with which I could get my root-drier at a temperature exactly as the thermometer registered. Of course, in putting that in the tooth there was a perceptible diminution in the temperature of the root-canal point, but by raising the heat a little we could get the temperature at the point of the root-drier, or within four or five degrees of about what the thermometer registered. This testing of the physical conditions could be done, of course, by physical processes, by an electrical process, I should say, if one had the time and could go into the experimental work, to determine very closely the exact temperature which we could get.

In regard to the suggestions made by Dr. Taft, I think they were very good ones; that is, in regard to the drying out of the teeth. Of course, when I say we must not extract too much moisture, I meant only to give the figures as they registered. There is a table in the May number of the *Dental Review*, in which I gave a number of experiments, the exact amount at each application in the root-drier, the amount of moisture extracted, and the exact amount of heat application. It is only supplementary to this paper, in giving the figures. A great long list of figures would not be of any practical advantage other than that of reference.

Dr. HARVEY. I asked the question of Dr. Cook because the fact that the maximum temperature that can be obtained in the mouth is not sufficient in my mind to produce a material effect in the way of fracture of the tooth-structure. Some nine months ago I was called upon by a physician who has charge of a laboratory in my city, to boil some teeth that were freshly extracted and examine them under the microscope before and after, to know what effect the boiling heat of 212° had upon the tooth-structure. We found there was no material change; no fracture could be detected. It is in the elimination of moisture as we find it in nature and time, a long period of time, which brings about that change. I think the doctor will find that not in many cases do we attain a degree of heat of 170° in the mouth, and were that a fact, the micro-organisms that we can get rid of through that heat will overbalance any evil effect that will come from the heat. I believe the latter to be of much more danger to tooth-structure than any heat we could possibly place upon a tooth in the mouth.

Dr. Cook. I did not mean to advocate that a tooth should not be dried out. I simply say that I believe that a tooth is weakened if you raise the temperature to such a degree. If you take a temperature of 170° C., it would be pretty hot. Besides, if you place a root-canal drier in the tooth at 170° C., which I did in a number of cases, the patient will feel it very quickly. I believe in the application of heat in the drying out of a tooth. I have done it ever since I have been in practice, but I will not raise the temperature of my root-drier to the degree I have done heretofore, as advocated by men who have written papers advocating the practice of putting the root-drier in until you have a temperature where you could hear the hissing sound. I do not do that any more. When you raise the temperature, as I state, to 90° C., I think that you can thoroughly desiccate a tooth, and you can thoroughly antisepticize that canal without injuring the tooth at all. I do not believe you ought to go over 130°. That is the idea I wanted to bring out. I did not believe we ought to go in the treatment of teeth above 130° C. I think the most of those who use heat at all use it at a much greater temperature than is necessary. You get perhaps as good results at a lower temperature, and that won't materially interfere with the teeth.

Dr. Clayton. Some one has spoken of water in the dentin. Do they mean water in the canaliculi or in the calcific matter? I have been in times past in the habit of raising the heat of my root-drier to a higher degree than now, just how high I do not know, but I cannot see that we accomplish very much by any degree of heat in the canal, because I think, however dry we may make it, it will very soon return to its normal condition by the circulation through the cementum. If it be not true, then we should raise the heat so high as to take out all of the free water of the canaliculi. Then, so far as drying the pulp-canals is concerned, I rely more for the destruction of micro-organisms upon some germicide. I believe if we can get the canals surgically clean, if we can by any means destroy the micro-organisms, the question of water does not amount to much. If we can get enough heat in there to destroy micro-organisms, all right. If we do not, if we take the water away and still leave the micro-organisms, we do not accomplish what we are after.

Dr. Thompson, of Detroit. Mr. Chairman, the gentleman who has just spoken touches me along a sympathetic line. I have the good fortune to have access to compressed air in my work, and very seldom resort to heat on my root-drier. I do, as he says, dry the root, and then apply a germicide in the canal. In regard to the paper, I was a little disappointed, having anticipated his touching the effect of heat upon the tooth-substance in general, and in such instances as occur from overheating of the disk or with the bur. It may be a little irrelevant here, but it has always been a question with me as to the effect of heating of a tooth in the preparation of a cavity. Now, does the heating of a tooth with such an instrument as this have any influence upon the future of the tooth as regards shortening its life?

Dr. Cook. There seems to be in the minds of many something in regard to the tooth retaining or taking up again the normal amount of moisture. I do not believe it does. It has been experimentally shown by physiological chemists who have worked with fibrous tissue that they cannot get it to return again to its original weight. One of the peculiarities apparently of the cell is not to take up again as much water as it must contain. Whether that is true in dentin or not, I am unable to say, but in this experimental work I took teeth that I had thoroughly dried out, filled them, and kept them as nearly as I could in the incubator under the normal conditions and for four weeks, removed the root-canal filling as nearly as possible, weighed the tooth, and it had not returned at all; in fact, it wasn't any heavier than it was when I weighed it after drying, before putting in the root-canal filling. I had kept it in a moist condition, where it would pick up moisture. If one experiments by removing the canal, taking fuchsin methylen blue, they will find that the coloring matter will not go from the periphery toward the center very well. But if you put it inside of the dentin it goes from the center to the periphery, staining through the entire dentin, while I have kept them for four weeks in the coloring matter, and found it to penetrate very slowly into the dentin from the periphery toward the center.

Dr. Clayton. There is one thing I would like to call attention to, and that is that in our experiments out of the mouth we haven't what we have in actual work, that is, light, which is of so much importance to all of us.

(To be continued.)

NEW YORK ODONTOLOGICAL SOCIETY.

A regular meeting of the New York Odontological Society was held on Tuesday evening, October 18, 1898, at the New York Academy of Medicine, 17 West Forty-third street; the president, Dr. S. G. Perry, occupying the chair.

Report of Clinic Committee.

Dr. J. F. P. Hodson. The clinic to-day was a most interesting and practically valuable one, and, following out the determination of your committee from the beginning of its labors to place before the society no operations but such as were demonstrated in detail from beginning to end, were favored with such demonstration from Dr. Geo. Evans, of the application of a gold-backed and banded crown upon an incisor with no gold showing. The result was eminently artistic and satisfying. I will ask Dr. Evans to describe the operation for the benefit of those who did not see it.

Mr. Evans, from McKesson & Robbins, presented the results of an idea which may prove of real value to us, consisting of cakes of magnesia saturated with pyrozone, three per cent. solution. It is an excellent cleanser for the mouth for night and morning use, and seems particularly well adapted for placing in a patient's hands to control the irritating effects of acid mucus upon the cervical margins of the teeth.

I (Dr. Hodson) exhibited, at the suggestion of Dr. Brackett, of Newport, and others of our Eastern members, a new dry-cell electric mouth-mirror made by the Endoscopic Co., of Providence. It is very compact, portable, intense, and astonishingly cool, light, and very cheap,—five dollars for the entire outfit.

Dr. W. W. Walker demonstrated the application of a medicated hot-air apparatus for dressing and treatment, which I will ask him to describe here again in detail.

Dr. William Carr presented a patient with a most interesting condition of compounded fractures of both jaws, caused by the busting of a dynamite gun. The case is under his treatment and was presented for our inspection. Dr. Carr will report the case and its treatment in detail later in a special paper.

Dr. W. W. Walker. This appliance is for the sterilization of infected root-canals. The bulb is heated over a little lamp. There is a small chamber at the end of the instrument, in which is placed, on a pledget of cotton, whatever medicine is to be used for sterilizing root-canals,—wood creasote, carbolic acid, etc. Dr. Timme uses China salt dissolved in creasote; it is a sort of iodoform without any odor, and is used very much in Germany. After the medicine is in, screw the end on tight; in order to protect the lip, put on the cover, screw the tip on and insert it. This lower part is worked with the foot, and you get a continuous stream of hot air. Dr. Timme makes only one application and fills the roots immediately. He has been doing it for two and a half years, and has thus far only had one failure. I was there for over two weeks, and saw him use it every day. His friends who use it also report great success.

The President. I am tempted to supplement Dr. Hodson's report of Dr. Evans's clinic, by saying there was one feature that is especially interesting to us this evening, and that is, to set the teeth so as to have a perfectly natural appearance, hiding all gold. It was a very satisfactory operation indeed.

There was another point which I think is not generally considered by the profession at large, and that is, that he made his pivot large at the base and tapered it, giving the greatest strength where it was needed, thereby saving the drilling of a parallel hole deep in the root, as is usually done. Another advantage seemed to be that in case of removal it is far more easily taken out if it is tapered in that way. The profession has been a little astray all these years, in thinking it necessary to set any pivot so very firmly, because the pressure is always against the tooth and tends to keep it in place. It is an advantage to have it easily removed, and that surely could be done by the method shown by Dr. Evans, not only on account of the taper, but also by the way he set it, using a thin solution of gutta-percha.

Dr. Geo. Evans. Some time ago, at one of the meetings of the First District Dental Society, the subject of a crown was discussed. Remarks were made, that in a case where there was an absolutely perfect-fitting pin and an absolutely perfect-fitting cap on the end of the root, that without a collar these in themselves were considered by many sufficient to support a tooth-crown. I do not claim anything new for my method, except in the details of the process. I presented a crown with an absolutely perfect-fitting pin in the root, and an absolutely perfect-fitting cap on the end of the root, with this addition: that the edges of the cap came over the edges of the side of the root and gave sufficient support to the crown, when force was directed on it in occlusion. I maintain that all the force that comes on the tooth-crown in normal occlusion is at an angle pointing slightly forward in the line of the lower teeth, and that a band or anything of that kind is almost unnecessary at the cervico-labial line of the root. What I presented this afternoon involved a method in which the pin was quickly fitted in the root, and the cap could also be easily fitted to the end of the root. To go into the details of the process here I think will be unnecessary. A gentleman asked me about the cementation of the pin. I endeavor to cement the tooth-crown in such a way that it is possible to get it off without demolishing the crown. In the crown I presented, the pin required very little cement to hold it in. The cement I use is gutta-percha applied in this way: I warm the crown, and while it is warm I apply a little chloro-gutta-percha to it, or in other words paint the post with it; the chloroform immediately evaporates, leaving a thin film of gutta-percha. I then apply the crown to the root, and remove it as quickly as possible. I warm the crown again, and repeat the operation a number of times, until I find I have it in position, and a mere film of gutta-percha on to hold it there. The last time I remove the crown, I have some zinc phosphate mixed to a cream-like consistence. I almost invariably use a square bottle on which to mix my zinc phosphate. You can hold it by the nozzle and use the sides as a slab. I fill the bottle with water. I winter I use cold water directly from the faucet, and in summer I use ice water. With that means you can sufficiently retard the setting of any oxyphosphate and get it to work satisfactorily. After removing the crown and heating it for the last time, just as I introduce it, I insert on the inside of the cap or on the end of the root enough oxyphosphate to fill any interstices that will be there, and then I put the crown in position. Should occasion require it, by thoroughly heating the crown, putting a heated piece of metal against the metallic parts, removing it occasionally as it disturbs the patient, and repeating the operation, you can remove whatever hold there is to the crown and cause it to give way. To be able to cement crown- and bridge-work with gutta-percha I think constitutes a new era in that line of work, because one of the greatest objections to this work has been the difficulty of removing it when occasion required. With bridge-work cemented on with gutta-percha, all you need to do is to apply a heated instrument, and in five minutes you loosen it so it comes off. It does away with the question of removable bridge-work, of which so much has been said and written. Removable bridge-work is almost impracticable, in my opinion, except in special instances. It is so laborious and so intricate in construction that there are very few patients who will remunerate the dentist for the time he spends in its construction.

Incidents of Office Practice.

The President. I have from Dr. Darby, of Philadelphia, a letter describing the contents of these three boxes, which are samples of tin fillings made by first-year students in the college there. Dr. Darby says,—

"This work was done by the freshman class of last year. The men who did the work had had no previous training. All of the work was done in the operative technique laboratory under the demonstrator. I think you will agree with me that it is a creditable showing for tin fillings." The tin used is S. S. White's No. 4, tin foil.

Dr. S. C. G. Watkins. I want to say a word in regard to what Dr. Evans was speaking about. Three or four years ago Dr. Evans gave a clinic before the First District Dental Society, at White's up-town dental depot. At that clinic he gave us his method of setting crowns, and described the use of the gutta-percha on the pin before inserting. I tried that method as he described it, and one of the teeth which I put on very soon after was a lateral incisor. This summer the lady broke the tooth off, and she was in my office this afternoon to have the crown removed. I found it was very easily done with an old pair of pliers, heated. I had another case last week, cemented by the old method; I had to drill the pin, and it took probably an hour and a half to get it off, and very likely weakened the tooth.

Dr. Walker. I would like to say a word about porcelain inlays. Last night we heard a paper by Dr. Ottolengui, who has been working somewhat in this line. He says one of the greatest difficulties he finds is the cementing of this porcelain in cavities. In Germany and Austria, and also in England, since Dr. Jenkins has been working up these porcelain inlays, they have become very enthusiastic about it. In Buda Pesth there is a dentist, Dr. Zsigmondy, who has a little furnace of his own, and who makes some of the most beautiful inlays I have ever seen. He never uses oxyphosphate, or any other cement. I did not have time to speak about this last night when Dr. Ottolengui read his paper, because I had to leave on an early train. He seemed to lay a great deal of stress on the cement used. This dentist uses a varnish; he said he was not prepared to give it to me then, because he had not perfected it, but he said he would send me the formula, or give me some of the liquid, and I have since written to him for it. He fixes the porcelain inlay as Dr. Jenkins does, but he puts it in with this varnish. It looks exactly like liquid sandarac. He claims that the minute any moisture strikes it it becomes hard, and gets harder every day, and no acid condition of the saliva will dissolve it. You can hardly see there has been any porcelain used, and it is almost the color of the tooth. He had pieces of varnish in bottles of absolute alcohol and in filtered water, and they had been there two and a half years. He had a piece of this varnish that he put in his mouth every morning to notice the effects of the saliva, and it had not changed at all.

German dentists and also English dentists are using the Jenkins method. A cement is used in placing it, and I have seen but few of these inlays that were absolutely perfect. The contouring becomes imperfect; they either bulge out or go underneath. It appears to me that with this liquid cement you can get a closer adaptation. I think probably the liquid I have written for will be here by the next clinic, and I take it upon myself to assist Dr. Hodson to arrange for a series of demonstrations of porcelain inlays. I saw last night some inlays made by Dr. Head, of Philadelphia, and he said he would be happy to come here and demonstrate his method to us.

Dr. F. T. Van Woert. Some months ago Dr. Darby came here and gave us a talk and demonstration on the method of Dr. Jenkins. At the time I think I spoke upon the subject, and laid considerable stress upon the use of cement as a great cause of their failure. Very soon after that a gentleman in my office, wearing a pair of glasses, dropped them on the floor and broke them. The lower part had a piece cemented on for changing the vision. It was a thin layer of glass over the other. I picked the fragments up, including this thin piece, which was not broken, and without thinking threw all into a jar of sulfuric acid that I had on the laboratory bench, and forgot all about it for a week or ten days. When I discovered it, I found that the cemented piece was not changed at all by the acid. I wrote to an optician and got a cement which he uses, and I have set three inlays since with it, with the most satisfactory result. It is perfectly clear, and the color of the inlay will be the same after setting as before. How long it will last I do not know, neither do I know what the cement is. There have been no disastrous effects to the tooth so far, and the results in the inlay are more than satisfactory. I thought that might be a solution of the question that Dr. Walker mentioned as to the cement used by the dentist in Europe.

Dr. Watkins. I had a talk with an optician on that very same subject, and he said that it was ordinary balsam varnish that they used for that purpose.

Dr. WILLIAM JARVIE, of Brooklyn, then presented the subject of the evening, entitled,—

SOME CRITICISMS SUGGESTED BY GOLD CROWNS, AND BY A CERTAIN CLASS OF GOLD FILLINGS OFTEN SEEN IN THE ANTERIOR TEETH.

My attention was especially drawn to this subject during the past winter by quite a number of cases that I happened to see. In some mouths were gold crowns which had been so inserted as to display the gold in a most repulsive manner. Another class of cases showed the manner of gaining access into cavities between the incisors so that the teeth were permanently disfigured, and a display of gold or other filling-material made necessary during the duration of those teeth. It seems to me that this is the age of the abuse of gold crowns. Crowning with gold has been and is one of the great advances that have been made for restoring to usefulness teeth that are decayed and broken down; but the abuse of those same gold crowns is a crying evil. The display of gold that we see in the mouths of people of good taste and refinement, as well as in the mouths of people of low degree, is simply barbarous, and to my mind it is on a par with the custom of the savages of South Africa who wear enormous rings in their ears or in their noses. I presume if these barbarians should see the gold in the mouths of the highly civilized people of the United States, they would think it just as barbarous as we consider their rings and other adornments.

The bicuspid gold crown is rarely needed, and rarely ought to be used in the mouth; but we see it continually, and coming from the hands of men from whom we expect better things. What has brought this subject more forcibly to my mind than anything else is the fact that a number of the cases I have lately seen have been done by recent graduates from colleges, indicating that if they were not following the teaching of the professors in the dental schools, it was the result of their environment while in the college.

Let me cite a few cases: One is that of a refined, intelligent, and prepossessing lady who had five gold bicuspid crowns in her mouth, two on either side of the upper jaw, and one on the lower; and to prove that *gold* ones were entirely unnecessary, I will tell you that I removed all of them. Strange to say, it had never occurred to this lady that they were disfiguring until I removed one of them, which was quite defective, and put a porcelain crown in place of it, and she was so pleased with the result that she requested me to remove the others, which I did, effecting a wonderful improvement in her appearance. The condition of this mouth was simply barbarous, because there was an unnecessary, extensive, and disfiguring display of gold. These crowns were inserted by a dentist who had been in practice a number of years.

Another case which came under my observation last winter was that of a lady who had six gold crowns,—four bicuspids and two upper central incisors. The effect was most repulsive, and the work was done by a young man who graduated from a dental college four years ago. The mechanical adaptation was good, but artistically and esthetically it was horrible. This lady was in my office last Saturday, and I said to her, "I have forgotten the reason you gave for having *gold* crowns put on your front teeth. What was it?" She said, "The dentist said that it was the only thing to do. I had been told he was a wonderfully skillful man, and I thought he was until he said, toward the finish of the work, that he was glad I had fallen into his hands, for the dentistry that I had had done before seemed to have been done by a blacksmith. I did not like that, for the gold fillings he referred to you had put in twenty-five years ago."

Another case was that of a child twelve years of age, with the six front teeth somewhat crowded, although there was a well-shaped arch. The dentist had extracted the lower left first bicuspid, which was free from decay, and crowned a first permanent lower molar on the same side, in which the pulp was dead. Just think of it! Extracting a perfect bicuspid so as to crown a pulpless first permanent molar in a child of twelve years. I thought that was one of the most outrageous cases of maltreatment I ever heard of. In ninety-nine cases out of a hundred such a tooth will not be retained more than five or six years. The gum is all inflamed now, and there is an incipient abscess there.

Another case which came to me in the early part of the summer was that of a lady who had a number of gold crowns, at least five, possibly six. They were all more or less defective, one being particularly so, more or less decay having taken place near the gum-margin. I removed the crown, and to my astonishment found an almost perfect molar underneath. There had been a large, simple crown cavity in it, involving only the grinding-surface,—an easy cavity to fill,—and yet the tooth had been covered by a gold crown. The crown had been imperfectly fitted, leaving a space between the gold and the neck of the tooth, and decay had occurred there. I filled the new cavity and also the one on the grinding-surface, and the natural crown is in evidence instead of the gold one. This occurred early in the summer, and I have not seen the lady since. My present intention is to remove every one of the crowns in that mouth, for from that one experience I have an impression that I shall find fairly good natural crowns under all the gold ones. The previous cases I have criticised solely from an esthetic point of view, but this is a case of rascality pure and simple.

Another class of cases, of which several have come to my attention during last winter, is where cavities between the incisors have been opened into from the labial surface, leaving the palatine surface intact, although the cavities were not very large, thus disfiguring the teeth and necessitating the display of gold or other filling-material. It is a discreditable practice, yet it is quite prevalent, and is done by men who are skillful manipulators of gold foil. I have seen some beautiful fillings in such cavities as far as the mechanical adaptation of the gold to the tooth is concerned, but from an artistic or esthetic point a wrong had been inflicted upon the patient.

There is another reason why the display of gold ought to be avoided if possible. Nothing is more beautiful and there is nothing more admired than perfect manly or womanly physical condition. Every decayed tooth is a defect, and a display of gold in the mouth calls attention to the fact that the wearer of it is physically defective, in regard to the teeth at least, and the persons in whose mouths such defects are seen are just so much less attractive in the eyes of those who see them. So one is doing an injury to his patients every time he permits a particle of gold to be displayed that can possibly be avoided. I do not say that gold should never be seen in the mouth. We must look at things from a practical standpoint; but if you can repair the ravages of decay with porcelain or insert gold so that it cannot be seen, do so and you will do your patient a service. I have seen bicuspids and even incisors crowned with gold, and it was the very best thing that could be done under the circumstances, but while they were very useful and served a good purpose, they were never beautiful. The subject of porcelain inlays that was referred to earlier in the evening would naturally come in here. One cause of the defect in porcelain inlays has been the cement. We can make a porcelain inlay so perfect that it is almost impossible to detect it; but in time the cement or oxyphosphate is dissolved, the inlay drops out, and you have a larger cavity than you had before. I think this line of investigation is a wise one, and if the cement that Dr. Walker has referred to will prove insoluble, and so adhesive as to retain the porcelain in the cavity, porcelain inlays would be perfection.

I have only introduced this subject, and I hope it may be continued by others. Go where you will, in the streets, in the hotels, in the theatres, and you see this display of gold. It is a crying evil. It is not in the line of true art, and we ought to do all in our power to prevent its spread.

Discussion.

The President. Dr. E. T. Darby, of Philadelphia, who was to open the discussion on this subject, writes that it is impossible for him to be with us to-night. He wished me to present his regrets, and inclosed a few remarks which the secretary will read.

The following from Dr. Darby was read by the secretary:

"The outline which Dr. Jarvie has given me of his paper suggests a field for thought and discussion. It would hardly seem possible, however, that there could be but one opinion as to the undesirability of placing gold crowns upon any of the anterior teeth, or even bicuspids, which would be shown in conversation, and yet the frequency with which we see the opposite is the best evidence that all practitioners are not agreed upon this point.

"I am frequently shocked when I see the mouths of some people to find glaring gold crowns on the bicuspids and anterior teeth. Only last week I met a lady in a trolley car in Philadelphia whom I had known years ago, but who for some years past has been living in one of the southern states. As soon as I had entered into conversation with her I observed that she had *three* gold crowns on her superior bicuspids, and a great display of gold in the incisors and cuspids. A pretty face almost ruined by this shocking display of gold.

"I have sometimes thought that this craze for crowning teeth with gold was more prevalent in the western and southern states than in the middle and eastern states, but it may be that my attention has been more frequently called to cases coming from those sections of the country. I should be sorry to think that the esthetic sense or love of the beautiful was a matter of locality. But of one thing I am sure,—the great majority of the people who compose my clientele would not tolerate the display of gold which is so frequently seen by all of us. I cannot condemn in terms too strong the practice which, of late, has become so prevalent, of mutilating teeth that gold crowns and bridges may be fastened upon them. It has seemed to me at times that in certain localities the dentists had gone mad in their desire to crown teeth and bridge spaces. I have seen in some instances a sound cuspid and second bicuspid mutilated that a gold crown might be put upon each to hang a tooth between. Worse than that, I have seen a lateral incisor covered with a *gold* crown, and a first bicuspid mutilated and then covered with a gold crown that a cuspid might be hung between them. These are extreme cases, and yet they illustrate the tendency on the part of some practitioners to bridge and crown everything that comes along. I would not seem to condemn gold crowns in every instance, nor for extreme cases. I would be just. I have in two or three instances covered as many as eight of the anterior teeth and bicuspids in a given mouth. But these were for men well advanced in life, where the teeth had been worn down at least one-half of their entire length, and where the occlusion of the opposing teeth was such that it seemed the only feasible thing to do. A long upper lip or a heavy moustache have in each of these cases done much to hide from view the objectionable display of gold. To have done the same thing in the mouth of a lady would have been exceedingly inartistic, if not absolutely reprehensible. Circumstances *do* alter cases, and what would be condemnatory in one case might not be in another where the conditions were totally different. The same may be said of the unnecessary display of large gold fillings in the anterior teeth. The highest degree of skill is evinced by concealing rather than exposing gold. Many of the fillings required in anterior teeth could be hidden from view if the operator would cut from the palatal rather than the labial border of the cavity. The Jenkins system of porcelain inlays when once adopted and generally put in practice will do much to limit this vulgar display of gold in the teeth. Only yesterday I was talking with an American dentist who has been residing on the continent of Europe. He told me that European ladies will not have gold fillings in their anterior teeth if there must be a display of the gold, much preferring white cement ones, even though it becomes necessary to renew them after a few months' time. I have no doubt that this objection has been one of the factors which has induced Dr. Jenkins to work so energetically to perfect his system of porcelain fillings. Just in proportion as education and refinement predominate, just in that proportion will the people demand the highest art, and that lies along the lines of the nearest attainable approach to nature. Barbaric people are pleased with glittering show. Civilized American and European people of refinement are pleased with natural beauty, and the nearest approach to that is *nature* itself. I should be glad indeed if the Odontological Society of the city of New York would put upon record its hearty protest against the indiscriminate practice of mutilating teeth for the purpose of crowning with gold, whether it be for the attachment of bridges or the restoration of so-called frail teeth."

Dr. J. ADAMS BISHOP. I have a little clipping from one of our "yellow journals" in this city. It is headed "Frowns upon a Fad," and reads thus:

> "TO THE EDITOR:
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> "Allow me to call your attention to the gold tooth, which is becoming so popular with the young ladies of this country. I am desirous of interesting you in this subject, so you will by your influence advise the people through the *New York Journal* to stop having one of the greatest gifts they possess destroyed (their teeth) just to have one of those unsightly gold teeth placed in the front of their mouths. What a pity it is that the American girls indulge in such a barbarous custom! It is not unlike one of the characteristic traits of some of the tribes on the Philippine Islands, who blacken their teeth to make themselves look more beautiful.
>
> (Signed) "M. B. BELL, D.D., Baltimore."

The writer of this article seems to think that this foolishness is due to the young ladies, or to the people; but I think it is more the fault of our operators. The workmanship of the present age in dentistry is so wonderful and skillful that it seems to me he is not a very good artist who places a gold crown in the front of the mouth by the side of beautiful natural teeth where he has the most exquisite work of his Creator to model after. As teeth in their color and size are created by a mind greater than man's, he may little hope to succeed who attempts to restore nature by such contrasting effects.

The talk we have here to-night ought to be put into actual practice by every dentist who desires to elevate his calling.

A week ago last Thursday I had a young lady in my office who had beautiful teeth with the exception of the left lateral. I cannot tell you the reason, but some operator had put a gold crown upon it between two teeth most beautifully colored by nature. The glare of that one tooth threw into shadow the rest of the mouth. It was well put on, but it was a great disfigurement. Last Wednesday afternoon I placed in the mouth of a young patient a lateral tooth. The life was still in the root; the pulp was healthy, and I saw no better way than to take a thin piece of gold plate and, with one of my handle-pluggers as a pattern, strike it up so as to make a half-thimble to fit the lingual side of that root. Then I took a porcelain crown and ground it out so that I could put on a lining; then these were fitted, soldered and cemented, successfully completing the operation. The life is still in that root, and the appearance is that of a good natural tooth. This method can be adopted in almost all cases, and its superiority to the use of a gold tooth must be evident to the most careless.

Dr. HODSON. There surely is but one thing to say from the esthetic point, or in fact even the civilized one. It is quite impossible to imagine any one with any artistic sense doing such a thing as placing these gold crowns in the front of the mouth. I have seen many of them in the mouths of the shop girls in the stores, and I fancied it was quite as much in consequence of their determination to have the vulgar display as it was the advice of the operator. I cannot conceive of any artistic operator doing it under any conceivable circumstances. I have carried even cervical cavities—those "impossible" things for temporary stopping—along for years and years, in the mouths of women particularly, who could not cover up their mouths with a moustache, with oxyphosphate fillings, recognizing the fact that they wear out rapidly and must be often renewed. I am praying for the Jenkins system to become so defined as a matter of practice that it can be used in difficult cases like cervical stoppings. It is easy enough to place a porcelain filling in the front face of the crown of a tooth, and to cement it with almost anything and expect it to remain. I have known of that being done twenty-five or thirty years ago. But the place where we need it most and oftenest is the cervical margins of the teeth, particularly in the mouths of women,—the very place where no cement of any sort will stay, and where, on the other hand, it demands the best cementation because of the shallow, marginless encircling cavities at those points. I should think very seriously of even smoothing off and accepting a broken-off section of a front tooth before I would even build it down with gold. I do not approve of gold in the front of the mouth. I would rather have my patients go about with half a front tooth gone than with one made of gold.

Dr. VAN WOERT. I want to reiterate what I said in Albany last May, which is, that nothing has come to the dental profession in the last twenty-five years that has done so much damage as crown- and bridge-work. The young men have been led to believe that they could save more teeth in that way than any other, particularly when busy and pressed for time. The result is a dropping off of the large gold or master operations, and eventually the elimination from their practice of that skill which is necessary for the making of a proper gold filling. You will agree with me that it makes little difference what the capabilities of the man are, if he follows that practice for a number of years he incapacitates himself for the proper handling of a reputable practice. As to the application of gold to the front teeth, as spoken of by Dr. Jarvie, I am sorry to say that in many cases I have made it more conspicuous than it should have been, but I have learned by experience. When we see teeth where crowns have been put on, like a cover to a box, without the preparation of the roots for their reception, and those crowns are taken off, the teeth filled and doing good service to-day, it seems to me time to call a halt.

Dr. M. L. RHEIN. It has frequently occurred to me during the past few years that the reputation of American dentistry is beginning to seriously suffer from this horrible abuse, of which we have heard so much this evening. It is unnecessary for any of us to go into any further details as to example. I doubt if there is a gentleman in the room who cannot follow up every case that has been mentioned with other cases that will parallel it or distance it. The motive I have in speaking upon this subject is to see if there is not some method by which this evil can be abated. The president, in asking the gentlemen to discuss this subject, said we should make our discussion as strong as possible,—of course in condemnation of this evil,—but of what avail will that be, in what way will it abate this crime that is being committed upon the teeth of a long-suffering American public? The class of people that we reach are the dentists of the country who read and pay some attention to the reports of our meetings in the journals. We all know that but a very minute proportion of those men, if any, are the ones who do these things. I do not at all agree with the view Dr. Hodson holds, that the people want this thing done. I have studied the matter very extensively and seriously, and my view agrees with that of Dr. Jarvie, that the person who had it done knew nothing about it, and relied entirely upon what the dentist told him. That has been my experience in every case I have seen. The dentist said that was the thing to do, and the patient, going with confidence to that dentist, permits him to do what he advises. Taking this view of the case, it has struck me that the only way in which we can lift this stigma from our profession is by educating the public at large upon the subject. We gain nothing by voicing our sentiments on this subject to the men who know better. It is true that there may be a few men among us who would debase themselves by doing this work, but I believe their number is very small compared with the great amount of this work that we see. The point struck me forcibly, when Dr. Bishop read that little clipping from the newspaper, that that is the way to reach this subject. It is for a society or a number of societies to educate the public at large. As a branch of the healing art, the dentists of the city of New York, and especially members of our societies, during the past twenty years, have held themselves very much aloof from anything that would give a taint of appearing before the public. The feeling has been that we did not want to do anything that would appear like advertising, and in that way I am afraid we have gone too much to the other extreme. The medical societies that meet in this building consider the public welfare as part of their sacred duty, and not only the attendance upon patients and obtaining their fees for their services. They look upon the education of the public as part of their duty, and it should be so with us.

The thought came to my mind while Dr. Bishop read the clipping that that was the only means by which this evil can be overcome. Educate the people thoroughly in this way, and I have not the slightest doubt that you would meet with cordial co-operation in your work. The livelihood of a large number of men whom we consider a disgrace to the profession would be greatly diminished, and some of them might have to seek another outlet. I often wonder that our Law Committee has not thought this a way of interfering with those men much more seriously than by legal proceedings. If they would educate the public as to what dentistry is when properly performed, and what abuse of dentistry leads to when it is done in this way, it would prove of great value. I do not care to go any deeper into this matter, except that I would like to see this society take some initiative in this respect. It would take very little work for a proper committee of this society to do something which, if commenced in New York city on a proper scale, would be taken up by the dental societies all over the country, and it would be but a few years before this evil would be abated.

Dr. A. L. Northrop. I am in hearty accord with the remarks of Dr. Jarvie and some of the other gentlemen. I do not think it will need legislation, or any great tact on the part of dentists, to do away with this evil. I recollect a number of years ago, when our good friend Dr. Arthur published a work on the "Arthur System." Many dentists went into it as the greatest thing that was ever brought before the public; but I do not think it is used much nowadays. I saw this summer so many people with bicuspids, incisors, and lateral incisors gold-crowned that I was completely disgusted, and I made the remark to a gentleman who was sitting on the deck of the steamer with me that it would not be a great while before it would be done away with, and many dentists who were doing it largely now would be ashamed of themselves. Crowns are now used extensively, but it will not be a great while before you will find that they will be used only where nothing else can be. It is one of those things that will remedy itself. Dentists are so confiding that if a man has a good thing and brings it before the profession, they all want to go into it. If there is a new gold, they all want it, and say it is the greatest thing that was ever used. In a little while it passes away. Two years ago nearly all the dentists in England and France were using the Solila gold almost exclusively; this year I could not find one in London who was using it exclusively. When crown- and bridge-work die out and we become conservative in the use of them, no doubt something else will come up. It will always be so. Patients come in and are willing to have the gold crowns taken off, which shows their dissatisfaction. Some dentists will tell you that they have drawers filled with bridge-work. That shows that their patients are dissatisfied with them. We are getting down to a conservative, judicious mode of operation. We do not need any legislation. When dentists advise their patients properly, we will get down to a solid and sound basis.

Dr. J. Bond Littig. Dr. Jarvie voiced my sentiments, except when he said he thought the professors were to blame. I would be very loath to be responsible for what the boys do when they leave college; I would be very loath indeed to have them tax me with their failures, any more than Dr. Jarvie would like to be held responsible as a State Board Examiner for those he passes. But my young men will bear me out that I have said all the way through, "Never put a gold crown on any tooth that you can fix in any other way," and you all know that I have tried for a long time to get something that will do away with gold. I have been trying to find inlays and everything else to do away with this indiscriminate use of gold.

Dr. A. R. STARR. I would say a few words in condemnation of a certain class of bridge-work often met with, in which, in order to avoid the appearance of too much gold, the operator inserts an artificial tooth in the anterior part of the mouth by means of a band or bar extending to a gold cap on one of the posterior teeth. For instance, a gold cap is made to cover a first molar, to which cap is attached an extension consisting of a gold bar or band passing along the lingual side of the two bicuspids, or else encircling them with narrow gold bands, and carrying at its anterior extremity an artificial cuspid. The simple stout wire or bar passing along the lingual surfaces of the natural teeth probably would not cause serious damage, since the contact points would be small; but when, in order to get greater strength, the broad band is used and molded to fit the contour of the lingual faces of the intermediate teeth, or where these teeth are surrounded with a narrow rim of gold, we see the worst results. We have seen these intermediate teeth melt away so rapidly by the carious process as to remind us of the melting of snow on a warm spring day.

Dr. J. H. HAÑNING. I wish to bear Dr. Littig out in what he said. During my freshman year he repeatedly told us never to use a gold crown in the front of the mouth. My preceptor, Dr. Elmendorf, also held the same view and practiced it. When I use a gold crown on the bicuspids, I face it with porcelain, taking an ordinary plate tooth and soldering it in. I have very little trouble in getting my patients to accept it, and they are often surprised to know it can be done.

Dr. VAN WOERT. It would seem to me rather the fault of the demonstrators in the colleges than the professors. The professors usually give pretty sound advice in that direction, but the demonstrators generally select the first case they can find to give the student an opportunity of making a crown or bridge, regardless of the location of the tooth or the desirability of it. There are hundreds of good teeth sacrificed for the sake of teaching the students the methods, and the result is they practice what they have learned.

Dr. EVANS. The abuse of any system must not be a cause for a condemnation of the system. We are going through an era in crown- and bridge-work in which the system is much abused, but this does not condemn it as a method of prosthesis in dental art. You can take any branch in dentistry and abuse it.

Operative dentistry has had its era of the display of gold filling in the front teeth. I have seen front teeth partly destroyed by the manner they have been cut away, right here at dental clinics in this city, so that some special operator could display his skill at manipulation of gold foil. People of refinement dislike a display of gold in their teeth, and at the present time, with the improved forms of separators we have, there is no excuse for it.

The demonstration I gave here to-day was to show a method of crowning a front tooth in which there is absolutely no appearance of metal, and yet everything is accomplished that can be accomplished by the gold collar crown. It is a simple method that any operator can practice, and he does not have to make a collar to the crown to do it. As to crown- and bridge-work lessening in practice, I think it is the other way. Because Dr. Sheffield does not do as much as he did is no evidence that it is not being done. It has passed from his hands into those of other advertisers, such as the dental parlors that are found on our principal streets.

When I wrote my treatise on crown- and bridge-work I thought I was going to elevate the subject of prosthetic dentistry, but the way the system has been abused, it has detracted.

I never crown a tooth with gold if I can better serve the interests of the patient by filling it. Gold crowns will last (and last well) when they are properly constructed, fitted, and cemented. I had one in my office the other day that I put on in 1883. It figured in the late law-suit of Rynear in regard to antedating his claim to the seamless crown, and was in perfect condition.

As to instructing students in dental colleges, I have for a number of years been an instructor in one of our principal colleges, and I challenge any student to say I ever recommended the use of gold in the front of the mouth. I always advise them to avoid it as much as possible. True art in dentistry calls for the concealment of the art. As to the use of gold crowns on bicuspids, there are cases in which I would prefer to put a gold crown on a bicuspid rather than a porcelain crown. I am a great advocate of retaining vitality of the pulps of teeth. No man can make me believe, except in a person of advanced years, that a tooth is just as good without the pulp as it is with it. Suppose we have a first bicuspid in which there is an acid condition of the secretions of the mouth, and a large mesial and distal cavity, with the pulp on the verge of exposure. The tooth has been filled and refilled. This often occurs in the first and second bicuspids. The refilling of that tooth will only result in a repetition of what has already occurred,—disintegration of the edges of the cavity and more decay. Would I destroy the pulp and put on a porcelain crown in preference to capping that bicuspid? Would I in my own mouth have that done? No. There are some people who would not tolerate gold, but in my own mouth, or in that of a friend whom I could influence, I would endeavor to cap the tooth with gold, feeling that I was doing the best thing under those circumstances.

Dr. RHEIN. I said nothing to indicate that I had any intention of trying to abate this nuisance by any form of legislation. It would be almost too laughable to suggest anything of that kind. I am sorry that my comment seemed to meet with so little approval. I do not doubt for a moment the correctness of Dr. Northrop's statement that this thing will find its own remedy in time, but it is our duty not to wait for that time, which may be fifty years from now. We owe a duty to the public which we have never performed. There is no dental society in the state of New York that has ever done a thing for the public, and in that respect we have been recreant to our duty, and here is an opportunity where we can perform a duty in which there is no selfish motive or interest. That was the idea I had in presenting this matter.

I believe in crowns as a last resort. They occupy a sphere that is of the greatest value to human kind, and Dr. Evans has done a great deal for dentistry in bringing this matter forward in the work he has published; but I disagree entirely with him that there is a necessity in a single case for a crown to be made entirely of gold, if it is in such a position as to be seen. I disagree with him so much more, because I do not believe that any tooth that is to be crowned should be allowed to have a pulp remaining in it. It only invites trouble in the future, and invites the possibility of a serious alveolar abscess at some time when that patient may find it very difficult to get proper professional treatment.

In the case of an alveolar abscess developing from a dead pulp under a gold cap, which was originally placed in position over a tooth containing a living pulp, I would be compelled on the witness stand to say that the work was done improperly, and that the dentist was incompetent. After the results of the latest investigation upon caries, and inflammation as affecting the life of the pulp, I could not conscientiously hold any other opinion. There are very few crown specialists who have given this subject attention that agree with Dr. Evans in placing caps over living pulps.

Dr. EVANS. I rise in total condemnation of such statements as Dr. Rhein has made. The idea of taking a pulp out of a tooth because you have to cap it is most absurd. I have heard such statements made, but I did not think Dr. Rhein entertained them.

What is the pulp? It is an organ in the center of the tooth that nourishes the dentin and keeps up its vitality, and because we would cap that tooth, should we destroy that pulp? There is no common sense in it. What has a cap to do with destroying the pulp in the tooth? It may, in some cases, if it is treated as some treat it,—the cavity not sterilized, and filled with oxyphosphate; but take the hollow tooth, sterilize it as I do, and fill it with oxychlorid of zinc, not oxyphosphate, after first coating the cavity with some varnish or chloro-gutta-percha, and thus restore the tooth in a measure to its original form before you cover it with a crown, and you will have different results. In oxychlorid of zinc you have an antiseptic filling that will preserve the tooth and never become septic; then you can crown it as you wish, and cement the crown on with oxyphosphate of zinc and feel that it will be safe.

Dr. RHEIN. What damage is going to result to the tooth, if you intend to crown it, by removing the pulp?

Dr. EVANS. You take its vitality away; you make it a dead member, and it is liable to inflammation. Alveolar abscess does not always ensue. I have in my mouth to-day two teeth which have been well treated, but which are tender in comparison to the others. One had an abscess, but it was treated and filled. Pulpitis occurred in the other, and the pulp was removed. I cannot press on that tooth to-day with that same reliance as I can on my other teeth. I think nineteen out of twenty gentlemen in this room will bear me out that they would rather have a tooth with a living pulp than a pulpless one.

Dr. Rhein. I am glad Dr. Evans has thrown down the gauntlet so openly, and I am ready to pick it up. The statements he has made just now show clearly that he occupies a position in this matter that our knowledge of the physiological conditions of the circulation around the tooth, of the object of the pulp, and the whole history of a tooth in the jaw does not bear out. The time of life when a crown is put upon a tooth is generally at the age when the function of the pulp in a useful capacity has absolutely ceased to exist, and where it can only become a detriment to the tooth. I will not stop to answer the statement that Dr. Evans has made, that the loss of the pulp makes the tooth a dead body. That has so long ago ceased to be exploited in a dental meeting that I am surprised Dr. Evans should have mentioned it. After a certain age of maturity has been reached, the point to be considered is the stability of the teeth in the alveoli. What the human race is suffering from more at the present time than anything else is the loosening of teeth, which is caused by a lack of nourishment around the pericementum. The latest investigations of Williams and Tomes have proven beyond peradventure that the circulation that goes to the pulp is the same which supplies the pericementum, and it does not take a strong amount of reasoning to see that if a given amount of nutrition goes through a given capillary, and if the pulp absorbs a portion of it, the pericementum will be deficient in its supply if sufficient nutritional matter does not pass through this capillary. At this age of maturity the pulp virtually stops nourishing the dentin,—this age may be as early as twenty-five or twenty-six, although it generally does not come before thirty-five. After that the pulp, instead of nourishing the dentin, fills up its own surface by means of the odontoblasts with solid dentin. This is done at the expense of the nutrition to the pericementum. As proven by the latest investigations, we have the cementum and the dentin inside of the cementum supplied with nutrition after this age mainly from the pericemental circulation, and not from the pulp circulation. It is easy for the gentleman to say it is not so, but the latest investigations have substantiated it, although this teaching may be contrary to old beliefs. I have cured many a case of pyorrhea alveolaris and made a loose tooth firm by removing the pulp of the tooth and filling the root, in that way giving a better nutritional supply to the pericemental circulation. It is for these reasons that I say when the pulp has been removed from the interior of the tooth, at a certain age, the pericemental circulation will improve, and that tooth stands a better chance of being immune from loss by pyorrhea alveolaris than if it were left with a pulp that in case of nutritional deficiency or from other causes would be constantly robbing the pericementum of the nutritional protoplasm which it daily requires for its healthy maintenance.

Dr. Jarvie. The discussion, although very interesting, has wandered somewhat from the subject of the paper, and before it is closed I would like to say two or three words in response to some things that have been said. I want to say to Dr. Evans that I commenced by paying a high tribute to gold crowns. They are of very great value. It was their abuse that I called attention to. I also said there were cases where putting a gold crown on a bicuspid was the wisest and best thing to do.

I did not want to be understood as making any reflections upon professors in our dental schools. I did not blame the professors because recent graduates were inserting gold crowns where they were not indicated, but said some of these operations were performed by young men just out of college, and they must have been influenced to do it by their environment while at college.

There are four professors in our dental schools in this room, besides several teachers and lecturers, and I have a very high regard not only for them personally, but for their teachings, so much so that I may ask them to lay still greater stress in their lectures to their students to avoid doing what some of the young men who have graduated do now. Being warned what not to do is sometimes of as much value as being taught what to do.

I think Dr. Rhein has made a very good suggestion,—viz, that the dental societies owed a duty to the people at large. Discussions at the meetings of this society, and their publication in the dental journals, reach comparatively a small percentage of the dental profession. The men who as a rule do what has been denounced to-night do not usually belong to dental societies, or read dental journals, and I think this society should issue some sort of an article, or a series of articles, to the press, making it known that the display of gold is not approved by the members of the profession at large, but that it is very objectionable.

The PRESIDENT. Before adjourning I want to add a few words. I recall no meeting of this society that has given me more satisfaction than the one we have just held. My gratification arises from the emphatic condemnation you have given the practice of setting gold crowns in conspicuous places in the mouth. For many years I have watched with pain and regret the growth of this dreadful practice. Dr. Jarvie, in applying to it the term "barbaric," has used the only word that fittingly describes it. I know no single word in the language that so fully expresses my feeling in reference to it.

For years it has been a wonder to me that our profession has not united in some emphatic and effective protest against it. That it should have gone so long unrebuked has shaken my faith in the boasted advance of dentistry throughout the world. It has constantly forced home the thought that dentists are still not far removed from the jewelers, from whose ranks in the early days so many were said to have come. It is a sad commentary upon the taste and refinement not only of the dentists who will do such work, but also upon the public that will allow it! Each are guilty of a disregard of the first principles of true art.

We boast of our modern civilization! What has it brought us? The "dental parlor," with its shocking show-case, and its shameless display of vulgarity!

It is safe to say that most dentists who do these things do them for the money to be made from them; we therefore meet commercialism at every turn,—on the railways, in the hotels, on the stage, in the parlors of the rich as well as the poor,—everywhere where men and women congregate.

It is enough to make one grow sick at heart. I have not words in which to express the feeling I have when I see the human face divine so treated!—speech made so ghastly!

It would seem as if the great masters of art through all the ages had lived in vain,—as if this age of mechanism and invention had crushed out or smothered that fine appreciation of beauty that should be one of the gentlest and choicest attainments of the race.

Shame on us as a profession that we do not make some effort to stem the tide that has already so degraded us in the eyes of those who have artistic instincts, and who feel that beauty after all is something *real,* and worthy of man's highest efforts.

W. J. Turner, M.D., D.D.S.,
Editor New York Odontological Society.

AMERICAN MEDICAL ASSOCIATION—SECTION ON STOMATOLOGY.

(Continued from page 1045, vol. xl.)

Third Day—*Afternoon Session* (Continued).

Dr. A. H. Peck, of Chicago, Ill., read a paper of which an abstract follows:

The Essential Oils and Some Other Agents: their Antiseptic Value; also their Irritating or Non-irritating Properties.

Very soon after assuming the duties of the chair of Materia Medica and Therapeutics in college work I became convinced that in our literature there was much loose statement in regard to the action of the drugs we employ in dentistry. Especially did this seem true in regard to the antiseptic powers of various agents employed as antiseptics. For these reasons I have, in my teaching in the Northwestern University Dental School, made trial of these agents in the bacteriological laboratory, as to their effectiveness as antiseptics, and have also in various ways made trial of their effects upon the animal tissues in order that I might speak definitely of my own knowledge of these matters. In this paper I will give briefly my observations upon a number of these agents.

To determine the antiseptic value of these agents the following experiments were conducted: Test tubes, each containing ten c.c. of sterilized mutton bouillon (which amount will hereafter be referred to as the unit of culture-media), were used. The broth in these tubes was, for the most part, infected with saliva from various members of the class. In each set of plants made a control tube was used,—*i.e.,* a tube in which the broth was infected with saliva, but into which no antiseptic agent was placed, simply to act as a control for the results of the remaining tubes into which antiseptic agents were placed. In each instance the control tube presented a full development of bacteria, thus proving the accuracy of each set of plants. One drop of the essential oil was first used in the tubes. When one drop prevented development of bacteria the quantity was gradually decreased in other plants, until the least amount that would prevent development was ascertained. To divide the drop I placed ten drops of alcohol in a small vial, and into this placed one drop of the oil; the alcohol dissolves the oil immediately. I then used in the culture tube such proportion of the essential oil desired,—one drop of the solution representing one-tenth of the drop of oil. Those drugs that were found ineffective with one drop were increased in other plants until found effective, or were given up as unsuitable or worthless as antiseptics. The same dropper was used throughout. When using the same dropper it will be observed that a drop of alcohol is smaller in bulk than a drop of an essential oil. Because of this difference in the size of the drops, ten drops of alcohol and one drop of an essential oil forms, as nearly as it can be figured, a ten per cent. solution, and one drop of this solution represents one-tenth of the drop of oil.

An antiseptic must be regarded as a poison to the vegetable cell, and many of them act also as poisons to the animal cell. I undertook this series of experiments for the determination of these differences of poisonous effects with the idea that in selecting antiseptics for use in practice we should have special regard to the effect of the agents upon the animal tissue to which they are applied. To determine the irritating or non-irritating properties of these oils an extensive course of experiments with them has been conducted during the past winter months, in connection with sores artificially produced on guinea-pigs, and also on my own person. To determine the effect of these agents when applied directly to soft tissue, the applications were made in each instance to my own person; and pardon me when I say that I believe I have come to positive conclusions regarding some of these agents.

Oil of Cassia.—We find that three-tenths of a drop is the smallest quantity that will prevent the development of bacteria in the unit of culture-media, and, there being sixty-seven drops of oil of cassia in one c.c., this agent is effective as an antiseptic in 1 to 2233 parts; that is to say, one whole drop of the oil of cassia would prevent development of bacteria in 2233 drops of infected broth. This explanation, if you please, will hold good in connection with each agent we have used. Oil of cassia is undoubtedly the most potent of the essential oils as an antiseptic. I have had at least a dozen samples of cassia, obtained from as many different sources, and upon analyzing them have found them to be adulterated in each instance. One sample especially, shipped direct from China to a dealer in Chicago, was found to contain fixed oils in considerable quantity. Others were found to contain alcohol, etc. This oil, as found in commerce to-day, is not as potent an antiseptic by about one-half as was the cassia obtained ten years ago. A reference to the work of Dr. G. V. Black along this same line, done about ten years ago, serves to prove the correctness of this statement. The samples of cassia he used at that time were potent in 1 to 4000 parts. If I could have obtained a pure, unadulterated sample of cassia it would certainly have outclassed oil of cinnamon as an antiseptic by a wide margin, but, as it is, as to the division of a drop, they have proven exactly the same. However, you will notice when we consider that agent that of the oil of cinnamon only sixty-three drops are required for one c.c., while of cassia sixty-seven drops are required. This simply means that one drop of the oil of cinnamon is just slightly larger in bulk than one drop of the oil of cassia, so that this discrimination in the number of drops to the c.c. still places the oil of cassia ahead of the oil of cinnamon as an antiseptic, the potency of the oil of cinnamon figuring out 1 to 2100 parts. While oil of cassia stands at the very head of the essential oils as an antiseptic, it is also true that it is the most poisonous in its effect upon soft tissue. As a test of the irritating properties of the oil of cassia, a pellet of cotton was saturated with it and placed in a small rubber cup, to prevent evaporation. This was applied to the surface of the skin and held there by means of a piece of court plaster large enough to cover it over and stick tightly to the surface of the skin about the edges. This was retained in place for twenty-four hours, during which time the irritation to the soft parts was by no means a pleasant feature. At the end of this period a blister invariably forms; however, the inflammation in the tissues at this time is not very great. The blister will occupy an area from one-half to one-third greater than that to which the oil is directly applied, and will fill and refill with serum several times before any tendency to recovery is noticed. At the end of forty-eight hours the inflammation in the parts involved is intense, and occupies an area four or five times as great as that to which the oil is directly applied. Numerous small independent blisters almost invariably form about the circumference of the inflamed area. This condition continues for several days, and while the inflammatory process is at its height the sore is one of the ugliest and most formidable in appearance it has ever been my privilege to look upon. These sores, also, are very slow in healing. It is with seeming regret on their part that the inflammation is permitted to subside and the parts to return to a normal condition. While in every way just as bad as has been described, they are, however, fraught with no serious consequences.

To further test the irritating properties of this oil, a sore, in connection with which there was considerable inflammation, was produced on a guinea-pig and treated for a number of days with the spray of cassia by means of an atomizer. So long as this treatment was continued the parts could not recover, but, quite to the contrary, the inflammation was greatly increased. Suppuration was then produced by infecting the sore with pus-microbes. This in turn was treated with the spray of cassia, with the result that the germs were destroyed and the pus-formation caused to cease, thus proving quite conclusively that this agent is an excellent germicide, when applied to suppurating surfaces, as well as a most potent antiseptic.

To my mind it is clearly proven that, while the antiseptic and germicidal properties of this oil are of the highest order, it is one of the most irritating, in its effects on soft tissue, of all the agents with which we have anything to do. And because of these effects, I feel perfectly justified in making the statement that oil of cassia should never be used as a dressing in the root-canals of teeth.

There is also another reason, aside from the above, why it should not be used, and that is its proneness to cause discoloration of the teeth. In almost every instance in which its use is continued for a time the teeth are more or less discolored, and in some cases very considerably. This is one of the most difficult forms of discoloration to correct that we are called upon to treat.

Is it not reasonable to suppose that when cassia is used in the treatment of pulpless teeth the above disagreeable conditions may occur in the soft tissues occupying the apical space, and the peridental membrane become involved in the inflammatory process? Have you ever thought that the excessive flow of serum which so frequently occurs from the tissues of the apical spaces of teeth that are being treated with this oil is nothing more nor less than the discharge of actual blister, as in the cases above recited? If these are reasonable suppositions,—and I believe they are,—is it still a source of wonder to any of you that teeth, under these circumstances, so suddenly develop such extreme tenderness to pressure as they so frequently do?

Oil of cassia, however, has a place in our practice as dentists. Cassia water sometimes, in the treatment of fistulous abscesses, is very useful. It is so stimulating to the tissues that it excites a healthy action on the part of the latter when other agents fail. Oil of cassia in the treatment of severe cases of pyorrhea, so called, where the pockets about the teeth are deep and considerable pus is present, is exceedingly useful. In such cases it may be used in full strength by means of a drop syringe. The oil is not permitted to remain in contact with the soft tissues a sufficient length of time to cause trouble, it is so soon diluted by the fluids of the mouth.

Oil of Cinnamon of Ceylon.—We find that three-tenths of a drop prevents development of bacteria in the unit of culture-media, and that sixty-three drops constitute one c.c., thus showing this agent effective as an antiseptic in 1 to 2100 parts. Oil of cinnamon of Ceylon, as you well know, is very much the same nature as oil of cassia. However, in some respects there is a marked difference between them. It has been demonstrated that oil of cinnamon is not so irritating to soft tissue as oil of cassia. An application of oil of cinnamon to the soft tissue, in the same manner that cassia was applied, and left for twenty-four hours, caused considerable irritation and formation of blister. At the end of forty-eight hours the inflammation was severe; however, not so intense as that caused by cassia, and the area of tissue involved in the inflammatory process was not great. Also, the blister that developed by the application of cinnamon was by no means as large as that from cassia, occupying the center of the inflamed area and spreading over tissue in extent equal only to that to which the agent was directly applied. The blister and inflammation are not so persistent as is the case with cassia, the former refilling with serum usually but two or three times, and the inflammation passing away quite readily.

A sore, attended with much inflammation, on a guinea-pig was treated with the spray of oil of cinnamon, with the result that it was further constantly irritated and thus prevented from healing. Suppuration was then produced in the sore, and again treated with a spray of this oil, the germs being destroyed and the pus-formation ceasing. The action of cinnamon was not so vigorous as that of cassia.

To my mind, cinnamon is altogether too irritating for use in the treatment of pulpless teeth.

A Synthetic Oil of Cinnamon, a sample of which I secured this spring from the first lot sent to this country (it being prepared in both France and Switzerland), proves to be as potent an antiseptic as the regular oil, three-tenths of a drop preventing development of bacteria in the unit of culture-media. Sixty-four drops of this oil constitute a c.c., thus showing it effective as an antiseptic in 1 to 2133 parts. It is, however, in its first effects, more irritating to soft tissue than the oil of cassia. An application was made to soft tissue, and at the end of fifteen hours a fully-developed blister, in extent larger than the area of tissue to which the oil was applied, was the result. There was very little inflammation or discoloration of the tissues. The first effect of this oil on the soft tissue was so vigorous that very much tenderness and inflammation were confidently expected to follow. In this, however, I was disappointed. The blister continued to refill with serum several times, but actually no tenderness or inflammation worthy of mention developed in the surrounding parts. I cannot recommend it for use in the treatment of pulpless teeth.

Beechwood Creasote is the next agent, from point of potency, as an antiseptic. Five-tenths of a drop prevented development of bacteria in the unit of culture-media. There are sixty-four drops in one c.c., thus showing creasote effective as an antiseptic in 1 to 1280 parts. This agent is practically non-irritating to soft tissue. An application remaining for a period of thirty-six hours produced practically no irritation. There was just the slightest evidence of irritation about the center of the spot where it was applied. There was no inflammation. The surface of the skin was slightly discolored and also slightly burned or seared over, but not to an extent that caused the loss of any tissue. A sore on a guinea-pig was treated with the spray of creasote, with the result that the inflammation gradually subsided and the sore healed with little delay.

Another sore in which suppuration was produced was treated in like manner, the germs being readily destroyed and the pus-formation stopped. Continued treatment resulted in the gradual healing of the sore. Creasote has proven its right to stand among the first, from point of potency, as an antiseptic; and because it has been demonstrated that it is practically non-irritating to soft tissues it is a safe agent, and in some cases a very desirable one, for use in the treatment of pulpless teeth. In a case of putrescent pulp, for instance, of long standing, one in which the lateral openings and also the dentinal tubules are completely saturated with mephitic odors and gases, creasote, in my judgment, is the most potent and desirable of the available agents. It is very penetrating, and one of the most persistent in its effects of all the agents at our command. I have used it to good advantage in severe cases of apical pericementitis. However, in some instances, where discoloration of the teeth has occurred, it has seemed that it was due to the action of the creasote. Creasote, being more or less of the nature of carbolic acid, possesses to a certain extent the properties of a local anesthetic, and because of this property it has quite a beneficial effect upon inflamed tissue.

Oil of Cloves.—Six-tenths of a drop prevented growth in the unit of culture-media. Sixty-nine drops constitute one c.c., showing it effective as an antiseptic in 1 to 1150 parts.

Oil of cloves is absolutely non-irritating to soft tissue. An application to the surface of the skin for thirty-six hours left no more evidence of having been confined there than so much sterilized water would have done. No irritation; no discoloration. Sores were produced on guinea-pigs and treated with the spray of oil of cloves. The inflammation subsided more rapidly than when treated with any other agent, and the sores healed as readily as they could. A sore in which suppuration was produced by being infected with pus-microbes was treated with the spray of this oil; the germs were destroyed and the formation of pus was stopped, simply proving beyond any possibility of doubt that, while effectively destroying microbes, the only action of the oil in contact with irritated, inflamed soft tissue is that of a quieting, soothing agent, serving to reduce the irritation and inflammation, and returning the disturbed tissue to its normal condition.

A sore on my arm, produced by an application of cassia, became infected and pus formed. This was washed thoroughly with 1 to 1000 solution of bichlorid of mercury every night for several times, and dressed in turn with iodoform, nosophen, and aristol, with no other result than an absolute failure to stop pus-formation. One night, after having washed the sore thoroughly with bichlorid solution, I poured oil of cloves onto the raw tissue. There was only a very slight smarting for a few minutes, after which its action was that of a quieting, soothing agent. The application was held in position for twenty-four hours. It was then removed; no pus was present, and the little granulations could be seen springing up all over the surface of the sore. It was immediately dressed with aristol and let alone for forty-eight hours, at the end of which time it was perfectly healed.

Another sore on the lower part of my right leg, the result of an application of formalin, was causing a great deal of trouble. The inflammation was severe, the tissues were very sore, the muscles felt bound up and were very painful, it being exceedingly difficult to walk. Continued treatment with ordinary remedies resulted in no relief. One morning, after having thoroughly cleansed the sore, a liberal quantity of oil of cloves was placed on it and the bandage applied. Within four hours' time the very disagreeable, drawn condition of the muscles passed away, the pain ceased, the foot could be moved in all directions as freely and comfortably as could the other, and could be used in walking just as well as it ever could.

Oil of cloves, for general use in the treatment of pulpless teeth, is certainly one of the best agents at command. It possesses the property of destroying or rendering inert septic and infectious material. In cases of apical pericementitis it is perhaps the best agent that can be used. It possesses local anesthetic properties to a marked degree, and, like some of the other agents, because of this fact serves to reduce the inflammation in the tissues in the apical space and causes them to return to a normal healthy condition.

Oil of Bay.—Seven-tenths of a drop prevented development in the unit of culture-media. Seventy-two drops are necessary for one c.c., showing this agent effective as an antiseptic in 1 to 1028 parts. Oil of bay, to me, is a comparatively new agent. A year ago last winter a gentleman spoke to me about oil of bay; said he had been using it for some time in the treatment of pulpless teeth, and that, so far as his clinical experience went, he had found it to be an efficient and agreeable agent. He stated that he had not observed any bad effects along the line of producing irritation, or anything of that sort. He requested that I test it; which I did, with the result above stated, which places this oil in the foremost ranks of the list of antiseptics. I have used it more or less since, and in one case that I have in mind thought the irritation and tenderness which was induced was directly due to the action of the oil, but in subsequent use have observed none of these bad effects. I came to the conclusion that I was wrong, and that there must have been some foreign irritating substance present which caused the trouble. I have made two applications of the oil to soft tissue, retaining each in contact for thirty-six hours, for the purpose of observing its effect, and no irritation resulted in either case.

A sore was produced on a guinea-pig with an irritant which caused intense inflammation. This was treated with the spray of bay for several days, and the closest observation did not reveal any additional irritation, but, to the contrary, the inflammation gradually subsided,—however, not so rapidly or willingly as when some other agents were used, as cloves. A sore in which suppuration was produced, on being treated with the spray of bay, yielded very nicely, the germs being destroyed and the pus-formation stopped. I think we are safe in concluding that oil of bay is a valuable addition to our list of agents for the treatment of pulpless teeth. So far I can see no objection to its use, and it is certainly a most effective agent.

Oil of Sassafras.—Seven-tenths of a drop prevented development of bacteria in the unit of culture-media. Seventy drops are required for one c.c., showing it effective as an antiseptic in 1 to

1000 parts. Oil of sassafras in contact with soft tissue for thirty-six hours produced no evidence of irritation. It has proven to be a very potent antiseptic. I have treated sores in which there was marked inflammation with the spray of sassafras, and the result was much the same as with the last previous agents; the inflammation subsiding, the irritation passing away, and the sore healing. It has not exhibited the ability to destroy germs and prevent pus-formation to nearly the extent that the stronger agents have. I have never used oil of sassafras in the treatment of pulpless teeth, but I certainly can see no reason why it should not be a potent and harmless agent in this connection.

Oil of Peppermint.—Eight-tenths of a drop prevented development of bacteria in the unit of culture-media. Seventy-two drops are necessary for one c.c., showing this agent effective as an antiseptic in 1 to 875 parts. An application of oil of peppermint to soft tissue continued for thirty-six hours produced no irritation, no discoloration of the skin, no inflammation, thus showing conclusively that this also is non-irritating to soft tissue. A sore in which considerable inflammation was present was treated with the spray of this oil, with the result that the inflammation readily yielded, the irritation subsided, and the sore healed. Another sore in which suppuration was produced was treated in the same manner, with the result that the germs were destroyed and the pus-formation was stopped, which proves that this agent is not only an antiseptic but also destroys the germs and thus prevents pus-formation. This is an agent which I have rarely ever used in practice. Three years ago I used it a little in treatment of cases, but discarded it simply because of its persistent, penetrating odor. Other than that, I can see no objection to its use in pulpless teeth.

Dr. Black's "1-2-3".—This is the next agent in point of potency. One and four-tenths drops prevented development in the unit of culture-media. Sixty-five drops are necessary for one c.c., showing this agent effective as an antiseptic in 1 to 454 parts. "1-2-3," as you well know, is a preparation given to the profession a number of years ago by Dr. G. V. Black, consisting—the mild solution, so called, and this is the one used in these tests—of one part oil of cassia, two parts carbolic acid crystals, and three parts oil of gaultheria. It has always proven itself a most efficient agent in the treatment of pulpless teeth, and has been used by very many in the dental profession for the last ten or twelve years, possibly more than any other one agent. I have used it continuously since I have been in practice, and have never observed any bad effects from its use: no irritation to the soft parts, no tenderness of the tooth to pressure, no inflammation resulting. Possibly some of you will wonder why "1-2-3" is such an efficient and desirable agent, consisting as it does of cassia, carbolic acid, and wintergreen; carbolic acid being not a positive persistent antiseptic, but one whose restraining effects upon the development of bacteria are only transient; oil of gaultheria being absolutely worthless as an antiseptic, and the use of cassia being so thoroughly condemned because of its extreme irritating properties. Of course, this agent depends upon the cassia for its antiseptic properties. The gaultheria is used as a diluent to the cassia. The carbolic acid was used more especially because of its anesthetic properties on soft tissue. When these different agents are properly mixed to form "1-2-3" it is the opinion of Dr. Black that there is more or less of a chemical union between them, so that the individuality of each separate agent seems to be lost, and the result is the formation of a new agent, or one with different characteristics from those possessed by the three individual agents. At any rate, it is non-irritating to soft tissue. An application left on for thirty-six hours produced no irritation whatever; there was only a slight searing and discoloration of the surface of the skin. Sores with much inflammation present were treated with the spray of "1-2-3," which did not produce further irritation. Its action was more like that of a neutral agent (so to speak), not irritating the sore nor, on the other hand, imparting to any appreciable extent a soothing, quieting influence, the inflammation subsiding just about as it would if left to itself with all irritating influences removed. A sore in which suppuration was produced was treated with the spray of this agent. It demonstrated its right to be classed as a very potent germicide; the germs were destroyed and the pus-formation ceased.

"1-2-3," as formed with the present cassia of commerce, is not so potent an antiseptic as that formed with cassia obtainable several years ago; this must be due to the fact above stated, that cassia is so adulterated at the present time. In fact, "1-2-3" is lessened in potency in almost direct proportion to the extent of the adulteration of the cassia.

Seven-tenths of a drop was effective in the unit of culture-media, as shown by experiments conducted by Dr. Black several years ago.

"1-2-3," as shown by these experiments, is abundantly effective, but if cassia is continued to be adulterated the time may come when it will not be. For general use, in the treatment of pulpless teeth, "1-2-3" is certainly an effective and excellent agent.

Carbolic Acid, Ninety-five per cent.—One and eight-tenths drops prevented development in the unit of culture-media. Sixty-one drops are required for one c.c., showing this agent effective as an antiseptic in 1 to 338 parts. Carbolic acid is not a permanent positive antiseptic. Its restraining power on the development of bacteria in the majority of plants one makes is only transient. One and eight-tenths drops prevented development for a period of three days, after which the bacteria developed in almost every instance. The restraining effect of this agent upon the development of bacteria seemed to be in almost direct proportion to the quantity of the agent used in the culture tube. The use of this agent in dentistry is so familiar I need not dwell on that point.

Oil of Myrtol.—One and nine-tenths drops were necessary to prevent development of bacteria in the unit of culture-media. Sixty-eight drops constitute a c.c., showing myrtol effective as an antiseptic in 1 to 357 parts. Oil of myrtol is an agent which I have used but little in practice. In the majority of cases in which I have used it there has been more or less irritation produced, more or less tenderness of the tooth developing, so that it impressed me as being somewhat of an unfavorable agent for this purpose. An application of myrtol to soft tissue for thirty-six hours produced decided irritation, and there was strong tendency to the formation of blister. The surface of the skin was destroyed. The irritation and inflammation present continued for two or three days, gradually abating. A sore on a guinea-pig being treated with the spray of this oil showed evidence of further irritation; so long as the treatment was continued the inflammation refused to subside. A suppurating sore being treated in the same way was certainly benefited by a consequent destruction of the germs and cessation of pus-formation. There is no doubt but that this agent is quite irritating, and one that should not be generally used in the treatment of pulpless teeth. There are cases in which I use strong myrtol water seemingly to good advantage, and these are in connection with abscesses with fistulous openings, especially those of long standing, in which there is more or less irritation of the soft parts throughout the tract of the fistule, and that uneasy, disagreeable sensation oftentimes experienced by the patient in connection with these cases.

Oil of Cajuput.—Six drops are necessary to prevent development in the unit of culture-media. Seventy-two drops are required for one c.c., showing this agent effective as an antiseptic in 1 to 120 parts. Cajuput is non-irritating to soft tissue. Applications of this oil to soft tissue, retained for thirty-six hours, produced no evidence of irritation; in fact, the discoloration of the skin was very slight, and remained but a short time. A sore on a guinea-pig, in which there was considerable inflammation, was treated with the spray of oil of cajuput, and no increase of the irritation was produced. Another sore in which suppuration was produced was treated in the same way, with the result that the germs were gradually destroyed; its action, however, not being positive, for if the treatment was discontinued for a day or two the pus-formation continued as before.

Oil of cajuput is an agent which I have never used very extensively in my practice. At first I did use it more or less in the treatment of pulpless teeth, but latterly I have not used it in this connection; in fact, the only use I make of it is occasionally to moisten the inner walls of the root-canals previous to filling with gutta-percha. For this purpose its non-irritating nature recommends it, and especially the fact that it is a solvent of gutta-percha, and causes the latter to adhere to the walls of the canals.

Eucalyptol (Sander's and Merck's).—Six drops each of these preparations are necessary to prevent development in the unit of culture-media. Seventy drops are necessary for a c.c., showing each preparation effective as an antiseptic in 1 to 116 parts. Eucalyptol in contact with the skin for thirty-six hours produced no evidence of irritation, no inflammation, no discoloration, thus proving that the agent is non-irritating and harmless in contact with soft tissue. A sore in which considerable inflammation was present was treated with the spray of this agent, with the result that the inflammation readily yielded, the irritation subsided, and the sore healed, thus further proving that it is non-irritating even to injured, inflamed soft tissue. A sore in which suppuration was produced was treated in the same way, with virtually the same results as with cajuput; it exhibited a restraining influence upon the development of bacteria and pus-formation, but the treatment being discontinued for a while pus-formation went on as before. As an agent to place in the root-canals of teeth after the removal of a pulp, following devitalization, in order to keep the parts healthy for a few days previous to root-canal filling, it is perhaps the agent that I use more than any other. It is certainly harmless, never exciting irritation. For the purpose of slightly moistening the inner walls of root-canals previous to filling, eucalyptol is the agent that I nearly always use.

The oil of eucalyptus as found in the market only produced a restraining effect upon the development of bacteria when a saturated solution was formed with the bouillon.

Oil of Gaultheria was carried in my experiments as high as eight drops, this quantity forming a saturated solution in the broth; that is to say, the broth had taken up, or dissolved, all of the oil that it could possibly retain, there being also a large number of free globules floating about in the broth; and still development of bacteria took place quite abundantly, showing that this agent is useless in restraining the development of bacteria. It is certainly of no use to us as an antiseptic.

Eugenol.—This agent resulted in the same way as gaultheria. Eight drops were used in the unit of culture-media, which amount formed a saturated solution with numbers of globules of the free oil floating about; and still the bacteria developed, thus proving that eugenol also is useless as an antiseptic.

Formalin.—Of late the dental profession has taken up this agent for the treatment of pulpless teeth, the treatment of abscesses, and for devitalizing pulps, etc., and many are reporting wonderful results from its use. Not long since I read an article in one of our journals in which the writer paid a glowing tribute to this agent as a most efficient and desirable one for the treatment of almost all conditions of pulpless teeth. Having had some experience with it myself, and because of many negative results experienced, having had my suspicions aroused as to whether it was a proper agent to be used about the mouth, I decided to investigate it as thoroughly as possible. First I tested it as to its antiseptic properties, and found it to be quite a powerful antiseptic. Of the formalin in preparation, which is a saturated solution of the gas formaldehyd in water (the latter taking up about forty per cent. of the former), four-tenths of a drop prevented growth of bacteria in the unit of culture-media. Fifty-six drops are necessary for a c.c. This shows formalin potent as an antiseptic in 1 to 1400 parts. Somebody has been so enthusiastic over this agent as to make the statement that it is fully as potent an antiseptic as is bichlorid of mercury. This is certainly a mistake. I prepared a 1 to 1000 solution of bichlorid of mercury, and found it required nine drops of this solution to prevent development of bacteria in the unit of culture-media. I prepared a 1 to 1000 solution of pure formaldehyd, which we have now in a solid state, the gas being reduced to such by chemical processes; and of this solution found that it required forty drops to prevent development of bacteria in the unit of culture-media, thus proving that formaldehyd is not so potent an antiseptic as bichlorid of mercury by at least fourfold. I next resolved to determine its ability to irritate soft animal tissue, the same as I did with the other agents. I took a small pellet of cotton, saturated it with formalin, placed it in a small rubber cup to prevent evaporation, placed it on the surface of the skin of the lower part of my right leg, and covered it over with a large piece of court plaster stuck tightly about the edges. This was placed there the 14th day of last March, at 12.30 A.M. I went to bed and went to sleep. Between four and five in the morning I was awakened by the pain, and could get no rest after that. The pain was quite intense, and of a very peculiar character. It seemed as if something were inside my leg, gripping it as if in a vise. Then it would take a turn and twist about, as if tearing the inside out. It would stop for an instant, and then the performance would be repeated with renewed vigor. The pain continued more or less severe all day. I wanted to keep the application in place for twenty-four hours, the time adopted for the other agents, but at the end of twenty hours the pain had become so constant and the tissues began to look so ugly that I concluded to remove it. The tissue to which it was applied and for about two inches in all directions was turned as white as pure snow, as if the blood were driven from the parts. The pain was lessened very considerably within a short time after the application was removed. The tissue to which it was directly applied was perfectly anesthetized to a considerable depth. Just at the circumference of the application there was much tenderness. There was much swelling, which seemed to be more like that of edema than of true inflammation. In about two or three days some color began to return to the parts, except to which the agent was directly applied, which latter never regained normal color. In about two days more a line, purple in color, began forming at the circumference of the point of application,—a line of demarkation,—and it became apparent that there was to be a break in the tissues. This break occurred and sloughing took place; considerable tissue was lost all over the surface of the inflamed area. The tissue in the center raised about the edges, but was very obstinate about coming away. From the time the agent was thoroughly absorbed in the tissues, physically I was not up to the standard; my appetite was more or less impaired, the digestion and eliminative organs were somewhat interfered with. These conditions continued to grow worse until the climax came in the form of quite a severe case of systemic poisoning, the poisonous matter being thrown off through the medium of quite a severe diarrhea and also much vomiting, the former continuing for a period of three days, the latter for one day, following which time my physical condition rapidly improved.

Having seen a number of cases that have been treated by physicians with various per cent. solutions of formalin, in which more or less sloughing of the soft parts has resulted,—one which I saw not long since in which as low as a two per cent. solution was used, in connection with which considerable sloughing resulted,—and also because of the very vivid recollections of my own personal experiences with it, I have come to the conclusion that we should get along without it in the treatment of diseased conditions about the mouth.

Discussion.

Dr. A. E. Baldwin, Chicago, commended the paper, but said it was one which required reading over carefully before a discussion of its many points would be profitable. He looked forward to reading it with profit when it was published.

Dr. F. C. Chamberlain, Colorado Springs, said that he was surprised to learn the effect of the use of oil of cassia, as he had been using it for several years and had never had irritation of the soft tissues nor discoloration of the teeth in consequence.

Dr. E. R. Warner, Denver, was very glad to have heard such an important paper read. The original investigators in the dental or any other profession are so few that we should heartily recognize one who has carried out such a series of experiments and recorded the results so carefully. In regard to the action of the oil of cassia, he could not agree with Dr. Chamberlain, as he had seen discoloration of the teeth follow its use, as well as an irritation of the membranes and soreness, which continued for a long time when the cause was unsuspected.

Formalin was a component part of many of the antiseptic preparations on the market; for instance, borolyptol, eucalyptol, listerine, and thymol. In some cases the formalin has been added to the original formula. Formalin used in full strength appears to be very effective at first, but seems to lose its power after a while. Its action on the soft tissues is dangerous. He had placed a pledget of cotton saturated with a forty per cent. solution of formalin in a tooth, and it caused exfoliation, like what follows the application of arsenious acid. His conclusion in regard to it is that it is not safe.

Dr. J. Taft, Cincinnati, said the irritating action of a medicament on the soft tissues would have no bearing on the use of it in the pulp-canal. The canal and the dentin surrounding it have lost their vitality and cannot be subject to irritating action, though, of course, it is possible the medicaments may in some cases penetrate the apical foramen. To avoid this possibility, it is well to close the canal with gutta-percha or Hill's stopping.

Dr. W. B. Hill, Milwaukee, asked Dr. Taft if he would close up the root-canal when it was full of putrescent material.

Dr. Taft said the root-canal should be washed out as thoroughly as possible, and anything still remaining should be removed mechanically as clean as possible; then the canal should be enlarged, the end sealed up, and disinfecting material introduced. Used in this way it is impossible that it should cause irritation. Some may think that these oils may be absorbed into the dentin and transferred through the canaliculi to the periosteum, but it is very doubtful whether this is possible.

Dr. PECK emphasized the fact that the aim of the paper was to present these agents and describe their action as antiseptics. Antiseptics are such substances as will restrain the action of germs; germicides are such substances as will destroy germ life. He is now carrying on a series of experiments to determine which of these are germicides. The gentleman who has used oil of cassia for eight or ten years and never had trouble on account of it is very fortunate. Dr. Peck's experience had been sadly different.

He could not agree with Dr. Taft as to the irritating action of medicaments on the soft tissues having no bearing on their use in the canals of the roots of teeth. It is of the utmost importance to select such as we know will not irritate the soft tissues. It is impossible to cleanse mechanically the canal of a root so that it will be safe to fill the end of it. There will always be danger of forcing some small portion of the septic matter through the foraminal opening, where it will be liable to cause trouble. Also, it is almost impossible to seal up the ends of the canals positively and not be in danger of obstructing the other parts of the root-canal.

There is no doubt that the bichlorid of mercury is the most potent antiseptic and also germicide, but in the presence of albumen serum the efficiency of the solution is destroyed. Where no albumen is present it is the most potent of all these agents. It is four times as powerful as formaldehyd.

(To be continued.)

UNION MEETING OF THE MARYLAND STATE DENTAL ASSOCIATION, WASHINGTON CITY DENTAL SOCIETY, AND VIRGINIA STATE DENTAL ASSOCIATION.

(Continued from page 967, vol. xl.)

FIRST DAY—*Evening Session* (Continued).

THE following paper was read by Dr. W. X. SUDDUTH, of Chicago, Ill.:

NARCOTISM.

Narcotism is a term applied to the condition of stupefaction or insensibility produced by the action of a narcotic. A narcotic is an anodyne hypnotic.

An anodyne is an agent used to relieve pain by lessening the excitability of the nervous system; while a hypnotic is any agent that produces sleep and is therefore of the nature of a sedative, and includes analgesics, anesthetics, and antispasmodics.

Narcotics, when first administered in small quantities, tend to stimulate the function of the brain, but if their use is persisted in they finally produce stupor, coma, and insensibility.

One of the peculiar phenomena evidenced by this class of drugs is their demoralizing effect upon the will, which is gradually undermined until the individual finds himself unable, of himself, to discontinue their use, and is bound in the fetters of narcotism or inebriety in some one of its many forms. Comparatively few are aware to how great an extent this evil prevails, and many are led to form the habit through ignorance of the baneful effect of the long-continued use of these drugs upon the system. The high pressure under which we live makes the use of some form of sedative an apparent necessity, and the frequency with which so-called "headache" and similar medicines are found in the home as a household remedy bespeaks the need of a treatise that will bring the subject before the profession in such a way as to forcibly carry the word of warning before it is too late.

The use of narcotics may be ascribed to several causes: First, for the temporary excitation derived; second, for the relief of pain; third, to satisfy a morbid craving arising from degenerative taints, many times the direct result of the use of narcotics by the parents of the individual. The subject thus naturally divides itself into (1) social, (2) hereditary, and (3) physical conditions. The social aspect of the question has been so ably and thoroughly discussed in the past that it would be presumptuous for me to hope to improve upon it, so I will not attempt it, but shall confine my attention to its treatment from the medical standpoint.

The question is a broad one, and must include a more or less full consideration of the subjects of heredity, biology, psychology, pathology, and therapeutics. These I shall try to divest of as much technicality as possible, and yet discuss the question in the light of the scientific advancement of the day.

"It is not all of life to live, nor all of death to die." We have had ancestors, and will have posterity, if we but obey nature's laws. It behooves us, therefore, to study well these bodies of ours in their relation to their environment in order that we may perform our individual duty in life and preserve our bodies a fit temple for the indwelling of the Holy Ghost, thereby insuring their purity and making it possible to transmit an unfettered existence to our offspring.

The consensus of opinion among the most advanced students in pathology of our day is that very few diseases are directly inherited, but that environment and food habits play a more prominent *rôle* in the production of disease than we were wont to think in years gone by. Children that are born congenitally diseased seldom reach maturity, and therefore do not come prominently into the discussion of the question of narcotism, except as they serve as terrible examples of its baneful effects, not only upon the user but upon his offspring as well. The offspring of parents addicted to the use of narcotics are very apt to be feeble, and fill the class known as degenerates, that is claiming so much attention at the present time. This class is without doubt less able to perform its duty in life, and is, because of its felt weakness, more liable to resort to the use of stimulants and narcotics to overcome the pains of existence. Indirectly, therefore, we may say that narcotism may be inherited. The tendency surely is, and if the individual is brought up in the same environment and partakes of the same food as his progenitors, the final outcome will result in a family of inebriates of some form or other.

That these inherited tendencies may be to a great extent overcome by change of environment and correct hygienic treatment I am fully convinced. The most unpromising form of degeneracy, however, resulting from inherited tendency, is found in the mental derangements that so constantly crop out in the progeny of "narcomaniacs." For these poor, afflicted individuals little or no hope can be held out. They are destined to pass through life with a cloud hanging over them, a hidden specter before them that at any moment may overpower and cause them to do some rash act for which not they but their sinful ancestors are responsible. God pity them!

Max Nordau, in his book on "Degeneracy," says that the marks of degeneracy are directly traceable to constitutional poisoning, and cites a quotation from Morel to substantiate the statement: "A race which is regularly addicted, even without excess, to narcotics and stimulants in any form (such as fermented alcoholic drinks, tobacco, opium, hashish, arsenic), which partakes of tainted foods (bread made of bad corn), which absorbs organic poisons (marsh fever, syphilis, tuberculosis, goitre), begets degenerate descendants who, if they remain exposed to the same influences, rapidly descend to the lowest degrees of degeneracy, to idiocy, dwarfishness," etc. That there is here opportunity for "a disastrous vicious circle of reciprocal effects" is also held by Nordau. "The drinker (and apparently the smoker also) begets enfeebled children, hereditarily fatigued—'born tired!'—or degenerated, and these drink or smoke in their turn, because they are fatigued. These crave for a stimulus, for a momentary artificial invigoration, or an alleviation of their painful excitability; and then, when they recognize that this increases, in the long run, their exhaustion as well as their excitability, they cannot, through weakness of will, resist those habits." He also cites Legrain as saying that "at the base of all forms of alcoholism we find mental degeneracy."

Talbot ("Osseous Deformities") says, "The individual may have inherited a neurotic or degenerate nervous system from his parents, who are the victims of excess or disease, such as syphilis, cancer, or tubercular diathesis, etc. In such cases the individual, in almost every instance, displays somatic stigmata. Such persons exposed to evil influences through society soon become dipsomaniacs. Such is the history of a large percentage of those who visit institutions. There is probably no one condition that produces so many forms of the degenerate, in the offspring, as that of inebriety."

Quotations might be cited indefinitely to show the baneful effect of narcotics upon the offspring, thus proving the truth of the Biblical saying, were it considered necessary to do so, that "the sins of the father are visited upon the children to the third and fourth generation."

In the vast majority of instances the cause of narcotism must be looked for in some derangement of the system, either acquired or inherited.

Few individuals are perfectly sound in body and mind; almost every one presents some stigmata that requires fortitude of character to withstand. The brave bear in silence; the cowardly resort to narcotics to relieve the pains of existence. That this is a trying age in which we live none will deny. Ours has been justly named the electrical age, and poor human nature is stimulated almost beyond endurance. Our ears are distracted with its everlasting buzzing; our eyes are dazzled by its brilliancy; our muscles are strained by its tension; and our brain and nervous system robbed of their needed rest by this subtle fluid that has turned night into day.

Unless some means is discovered by which we can better adapt ourselves to our environment and conserve our energy among these trying times and more quickly recoup it when lost we shall, as a nation, pass into a state of decadence such as has never before been equaled. The vast discrepancy in the correlation of forces, the predominancy of waste over repair in nervous energy, has, however, only recently begun to attract the attention of the scientific world. How best to adapt the internal forces of the organism to the exigencies of its environment is the most pressing question of the hour. We are to-day beyond doubt suffering the dire penalties of the use of drugs used to induce sleep, and many an inquiring mind is turning to the solution of the question of a less harmful way of obtaining the desired condition of rest without the baneful effects of drugs. Unless we stop to consider the subject, we can hardly realize the great strain under which we live. City life tends to the use of narcotics. There are comparatively few inebriates in the country. In our great cities we are in a constant whirl of conflicting suggestions; and while out of the babel of voices and the ever-unrolling panorama of printed matter that is forced upon us, we catch only a glance of the passing vision and heed but a fragment of the unending song of weal or woe, yet it all enters into our consciousness and forms a part of our future existence. It thus becomes the source of our proverbial nervousness and hysteria, "the enormous increase of which," says Nordau (*op. cit.*, p. 36), "in our day, is partly due to the same causes as degeneracy, besides which there is only one more general still than the growth of large towns,—a cause which perhaps of itself would not be sufficient to bring about degeneracy, but which is unquestionably quite enough to produce hysteria and neurasthenia. This cause is the fatigue of the present generation."

That hysteria is in reality a consequence of fatigue Féré has conclusively demonstrated; that "tired feeling" so commonly expressed among women is undoubtedly the forerunner of hysteria, and demands the use of sedatives and narcotics in the form of headache and other similar medicines, together with the excessive use of tea and coffee.

Now, this condition is not confined alone to American women, but the business and professional man in his down-town office, that modern Babel, is rapidly developing hysteria too, and seeks surcease from the pains of business in those deceptive agents, coffee, tobacco, and alcohol, later on to become their slave. He is ever in a whirl of excitement. He whirls to his office by express at thirty miles an hour. He keeps up the same gait during the day, not stopping for a moment's rest at noon, but must needs dine at a café where he can snatch his own lunch, begrudging the time even that this requires, and proceeds to swallow it with the same dispatch and rushes back to business for another stretch of hours, only to be whirled home at night and into a premature grave, with the epitaph upon his tomb, cut by electricity too, "Poor fellow, he had not time to live out half his days!"

Is it any wonder that narcotism is on the increase, and that the offspring of such parents are neurasthenic and cut off in the flower of their youth by a "dispensation of Providence," or if permitted to live to become narcomaniacs in some form or other?

Then, again, the use of narcotics is indulged in by a certain class who have little else to do, as a pleasant occupation. It serves to pass the time and ease the pains—*fin-de-siecle* ones—of existence. There are no end of special narcotics manufactured for this class, from the simple smelling-salts to the most subtle perfumes and snuffs containing the most volatile poisons known.

These are used in increasing quantities and strength, for the system soon becomes habituated to the milder ones, and demands stronger and stronger potions as its daily allowance. The cocain or morphin habit, as well as many another equally vicious one, is fixed on many in this way. These are all the more dangerous because of the lack of knowledge regarding the component parts of these proprietary preparations. The habit is fixed while yet the use is but begun, so quickly do some of these habits take hold of the individual, dependent to a great extent upon the temperament and physical and mental condition of the person indulging.

Another feature of narcotism is that the depth of the degradation increases out of all proportion to its former rate of progress as soon as the individual finds that his secret is known. Undoubtedly moral sentiment in this country has a marked influence upon the habit of inebriety in nearly all its forms. Some persons are held in check for a time, but when the habit once gets firmly fixed it braves all eyes and demands its satisfaction without let or hindrance. When the *habitué* loses his own self-respect, then he goes down into the waters of Lethe with lightning-like rapidity, the depth to which he descends being in an inverse ratio to the height of his station in life and the importance of the position he holds. This is something more than a comparison of contrast. It is an actual fact, and has been noted time and again. The reason therefor is found in the matter of public sentiment, which falls on the individual with a weight in proportion as he is capable of appreciating it, according to the law of the Medes and the Persians. In this case "the wind is not tempered to the shorn lamb," but beats down upon his defenseless head in pitiless fury.

Charity finds no place in the mind of the community for the victim of narcotism, because it looks upon the habit as self-imposed and consequently needlessly incurred. They forget that in many instances it has been fastened upon him by following the advice of his nearest friend or the family physician. The ease with which these vicious habits are sometimes acquired is something appalling to think upon. Cases are on record where as the result of one single injection of cocain for the extraction of a tooth, its use was acquired. The same is recorded of the morphin habit. It is never safe to say that an idiosyncrasy does not exist that will make it dangerous to use a narcotic in any given case. This can never be known in advance of its use, and then it is often too late. The harm has been done, the deed accomplished.

These idiosyncrasies arise out of special bodily conditions existing at the time as the result of physical disability, or by reason of some congenital predilection toward acquiring the habit. Healthy individuals without neurotic tendencies may indulge with apparent impunity for a time, but sooner or later a temporary indisposition may so weaken the will as to overcome the power of resistance, and the habit become fixed at a time when it is least expected. But even if the individual himself does not succumb to the use of narcotics, their use will make itself felt on his progeny, who will early be found on the road to inebriety. Any use of these dangerous drugs, especially in the hands of the laity, is an abuse. The only safe rule in life is total abstinence, and how few there be that follow it.

Discussion.

Dr. H. S. Harvey, Battle Creek, Mich., said that the subject of narcotism was a very important one. He had met several hundred of the unfortunate sufferers from drug habits, and he was sure that there was no responsibility greater than the responsibility that a physician takes when he prescribes such drugs. In his experience forty per cent. of the male users of these drugs are men of the medical profession, and fifty per cent. of all who use them are men and women of the leisure class. The wives of doctors are ten per cent. He did not think such drugs should ever be prescribed by dentists; it would be better to let the responsibility rest with the physicians.

Dr. W. A. Mills, Baltimore, was always very careful about administering cocain, and never let the patient know when it was used, unless it was asked for, and then he makes an extra charge for the cocain. He mentioned the case of the wife of the proprietor of a medicine containing bromin,—a bromo something or other,—who took ten sample bottles of the preparation every day and whose daughter, twelve years old, took four bottles. In his opinion they had established a habit which would be practically impossible to break up, and which would wreck their lives unless broken up. Another important thing to remember is that we have no right to prescribe any preparation of whose constituents we are ignorant. Any remedy prescribed to allay pain will be used again, without prescription, when the pain recurs, if the patient knows what it is, and the habit will grow with every repetition.

Dr. Wm. A. Montell, Baltimore, considered the paper a timely warning to the dental profession. We are commanded in Holy Writ, "Thou shalt not put the cup to thy brother's lips to make him drunken," and this applies with even more force to putting drugs to the lips of our trusting patients to fasten a disastrous habit on them. We must relieve pain when severe, but we all know that a man who has been addicted to drink and has reformed is often utterly unable to resist the sight of liquor, and the last state of that man is worse than the first if he touches it. So it is with the use of narcotic drugs.

Dr. D. E. Wiber, Washington, thought physicians were much more frequently the cause of the establishment of habits of narcotism than dentists. They are too ready to use the hypodermic needle, and patients soon learn to use the same whenever they have pain. He did not, however, believe that bromids were harmful except to the stomach.

Dr. Mills said that he had it from a good authority on toxicology that bromids in any form were most dangerous in their liability to produce insanity.

Dr. Montell said that bromid of potassium prescribed as a sedative was very liable to become a habit, and its continued use was certain to break down the nervous system. He did not believe, however, that all articles bearing the word "Bromo" as part of their title contained bromin; one of them depends upon the effect of caffein for its sedative action.

There was no further discussion, and on motion the convention adjourned till next morning.

Second Day—*Morning Session.*

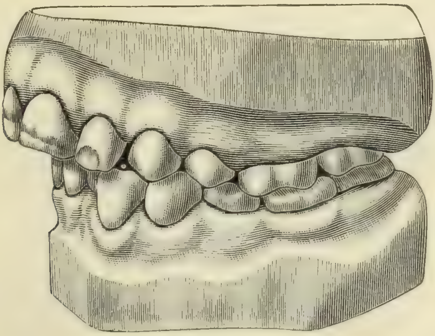
Dr. A. W. Sweeny, of Washington, D. C., read the following paper:

Malocclusion resulting from Imperfect Development of Teeth.

The models submitted herewith illustrate a case of some interest. The patient, a girl of twelve, presented the condition shown by Fig. 1 when seen a short time ago. The incisors of both jaws show the marks of imperfect development some little distance from the cutting-edges, beyond which point the enamel is very fairly well developed. The bicuspids so far as erupted are in very good condition. The left upper cuspid has not erupted, and very little, if any, trace of it is to be discovered. The first molars appear at the first glance to be almost destroyed by caries; but upon more careful examination it will be seen that, while decayed to some considerable extent, it is really the result of imperfect development, which is most obvious, for, while the models but imperfectly show the two conditions of the teeth, it may readily be seen by an examination of the mouth that over the cusps, and, indeed, the entire occlusal surfaces of the teeth, the enamel has scarcely developed at all, while from about midway of the crowns to the cervical margins the enamel is fully up to the average condition.

The child's history points clearly to a case of malnutrition. Owing to lack of natural nourishment by the mother, she was raised mainly on some one, or more, of the various manufactured infant foods; and, whether for that reason or not, was an exceedingly puny and ill-nourished child for nearly all the earlier part of her life. The crowns of the temporary teeth, so I am told, seemed very imperfect at the time of eruption and very soon decayed away, while the gums were almost constantly in a highly inflamed condition. For a considerable time before the eruption of the first molars, all of the temporary teeth were decayed and broken off quite to the gum, and no doubt by that time an unnatural bite had been established. Owing, almost beyond doubt, to the lack of temporary teeth to preserve a proper occlusion, and the fact that the first molars were so imperfectly developed as to unfit them for the task of bringing about any improved conditions, the articulation became fixed as shown by Fig. 1. The lower jaw fell back about the entire width of a molar tooth beyond the normal, and the bite was so close that the bicuspids had only erupted about one-half the length of the crowns, while the second molars, though only just making their appearance, were adjusting themselves to the very faulty occlusion. The effect upon the child's features may well be imagined, the chin receding so greatly as to entirely spoil the expression.

FIG. 1.

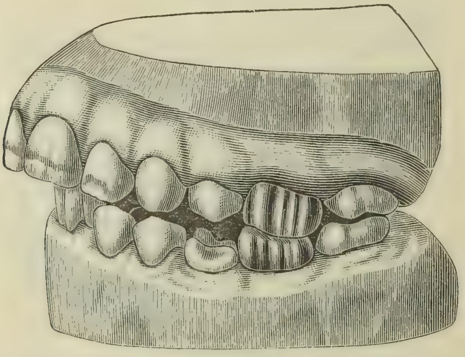


Previous to my undertaking the treatment of the case nothing had been done, but about the only suggestion which had been offered in the way of proposed treatment had been a proposition to extract the first molars. Just why that course should have been advised, I am utterly at a loss to determine. It seems, however, to be a fact that many practitioners when placed in a quandary are prone to recommend extracting those unfortunate teeth. To my mind, a greater mistake could not well have been made in the case in question.

Conceiving the cause of the trouble to be as above indicated, and that the deficient development of the first molars allowed the lower jaw to recede and approach the upper much too closely, the line of treatment which suggested itself was to open the bite and so adjust the occlusion of the first molars as to carry the lower jaw forward, or, in other words, to resort to the at one time much debated procedure of "jumping the bite." Despite the unfavorable appearance of the first molars, none of the cavities were sufficiently deep to occasion any complications in the way of pulp-exposure.

The method of treatment adopted was very simple, consisting merely of making four temporary crowns, which were adjusted without cutting away the teeth at all, and which are fairly well shown in Fig. 2. As will be seen, the lower crowns are long at the anterior side and slope toward the posterior, while in the upper the shape is reversed. When in place it is impossible for the child to close her jaws without allowing the lower to come forward, while the increased length of the artificial crown prevents the bicuspids and second molars from touching and allows them to erupt properly. About a week since it became necessary to readjust the crowns, when it was discovered that already the second molars have erupted sufficiently to render it unpleasant to attempt to close the teeth in the old position, and I confidently expect to see a new, yet natural and comfortable, articulation result, which will render a return to the original faulty one impossible when the second molars shall have developed sufficiently. The remaining temporary molars have simply been left, for the time being, as a concession to the child's natural aversion to having them extracted. They do not affect the case seriously at present, and will soon be removed to permit the bicuspids to take their place, and, at the same time, to admit of overcoming the slight irregularity of position of the lower incisor.

FIG. 2.



Pending the treatment, the cement in the caps is acting as a protection to the malformed surfaces of the first molars; the teeth are comfortable, and at the recent examination were not sensitive.

Upon the final steps in the treatment of these molars, when the proper articulation shall have become established, I have not yet fully determined; but in view of the fact that the defective portion of the teeth is confined to the half of each crown which embraces the occlusal surfaces, while toward the gum there is sound enamel, unbroken by any approximal decay, I am inclined to the belief that to cut away that sound enamel in order to secure an accurate fit for crowns designed to be permanent would be a mistake, and that the better and more rational course would be to cover and restore all the missing and defective surfaces by means of contour gold fillings. While such operations would be large, unquestionably, and seemingly quite formidable, they should not really present any obstacles which a competent and earnest operator ought to dread. The question of real moment to be determined upon is the selection of the method of treatment best calculated to be of benefit to the patient. Weighed against that, all questions of expediency and of the difficulties to be surmounted in the course of the treatment become matters of but secondary moment.

A further report of the case is given by Dr. Sweeny, dated December 1, 1898, as follows:

When last seen the case of which you ask was showing up very satisfactorily. With some slight alterations to the occluding surfaces of two of the temporary shell crowns (which are of German silver) to allow for the change brought about in the occlusion by the greater eruption of the bicuspids and second molars, everything kept moving along very nicely.

When last seen, several weeks ago, the bicuspids were adjusting themselves to a very clever articulation, and the second molars had erupted quite fully; I should say quite as fully as would ordinarily be seen in a girl of thirteen years of age. The change from the condition of affairs shown by Fig. 1 was very marked, for there it is shown that though the second molars had barely erupted, they came closely together, as the bite was so close on account of the poorly developed first molars. I think it quite probable that if all the temporary caps were to be removed now, the lower jaw would fall back somewhat, but I do not believe that it could, even with all the crowns off at once, go back to such a degree as shown in the original models, as the second molars have erupted too far to permit it; but I have, of course, no idea of allowing the crowns to be removed as yet.

It is my ultimate intention, as indicated in the original paper, to build up the four molars to a full contour with gold, giving the occlusal surfaces the same general form as now shown by the caps,—*i.e.*, such a form as will tend to cause the lower jaw to move forward slightly when the teeth are brought together. Such treatment must, in my opinion, result in rendering the condition now maintained by the caps a permanent one.

My reason for contemplating these extensive restorations by means of gold contour fillings instead of crowns is, as indicated in the paper, because the teeth are really not badly decayed, though they seem so at first sight, but are badly developed. The cusps and entire occlusal surfaces and about two-thirds of the way to the gum-borders are only very imperfectly covered with enamel, dark and uneven, yet hard and not much decayed, while all around the margin of the gums and quite a little distance from it there is a good, strong, sound enamel, terminating in a pretty even ridge all around each tooth, where the area of imperfect formation ends. In view of this, with the further fact that all the pulps are perfectly healthy, I think it would be a great mistake to cut away the belts of sound enamel in order to fit permanent gold caps, and so thoroughly does the young lady agree with me that I have already been urged to build up the teeth and do away with the temporary caps. I see no reason for hurry about that as yet, and think the case will go on very well as it is, for a while longer.

When I commence to contour the teeth, I shall build them up one by one, testing the articulation as I go along with the remaining temporary caps.

(To be continued.)

AMERICAN DENTAL SOCIETY OF EUROPE.

The twenty-fifth annual meeting of the American Dental Society of Europe convened at the Hotel Cecil, London, England, at 10.45 A.M., Wednesday, August 3, 1898. After the transaction of routine business, the president, Dr. CHARLES H. ADAMS, of Frankfort-a-M., read the annual address, in which he recited the creation of the organization in Switzerland twenty-five years previously, and described its growth until at present it counts among its members nearly every American dentist practicing in Europe.

After reviewing the progress of knowledge in medicine and surgery leading to their present high stage of scientific advancement, he showed that dentistry had kept fully abreast with the progress in medical knowledge, and that the history of dentistry is the history of discovery and invention of means and appliances for the alleviation of human suffering. He spoke with approval of the effort being made in America to prevent the promiscuous issuing of diplomas to incompetent persons, and called attention to a co-operative movement on the continent to make it impossible for foreigners to procure diplomas from American colleges without having first submitted themselves to the full course required by law for American students, thus raising the standard of the profession abroad.

Dr. N. S. JENKINS, of Dresden, then read the following paper:

THE PERFECTED PORCELAIN ENAMEL.

When this society met in Dresden, two years ago, I fondly imagined that I had nearly reached the end of my experiments and had, therefore, the temerity to announce a new material for inlays and pivot teeth. But the end was not yet. After nine months' further experimenting I was able to decide upon the constituents of the body only on May 15, 1897. From that date until March 24, 1898, I was occupied with studies of color; but then the work could be pronounced finished. As the preliminary announcement was made before this society, I caused a circular to be sent to its members, so soon as my experiments were finished, that they might be the first to be informed of a discovery which, I hope and believe, will mark an era in the practice of dentistry.

Many of us have dreamed of a plastic material, easily introduced and firmly adhering to the walls of a cavity, which should be indestructible, semi-transparent, and of any desired color; but although a great amount of time and labor has been expended in experimenting in this direction, the results are by no means encouraging. The best results have been obtained with phosphates, but zinc phosphate, though wrought by the hand of genius, remains zinc phosphate still. Even were it possible to produce such a filling-material, it is by no means certain that it would prove to be a blessing. The wonderful results which the accomplished modern dentist achieves, as a matter of course, in his every-day practice, have been made possible to him only because dentistry, as now taught, is so difficult a branch of the great science of healing. He has to do with the most common and one of the most distressing forms of human suffering. To its relief he must bring not only a well-trained mind and broad scientific attainments, experience, conscientiousness, and good judgment, but also a self-control which never falters, and a manual dexterity supremely great. He owes his marvelous manipulative skill to the fact that many of the operations he is constantly making are among the most delicate and difficult known in the whole range of surgery. If the process of filling were suddenly made so simple, as would be the case through the discovery of such a plastic material as is outlined above, it is quite possible that this high order of skill would, for a time, deteriorate, to general disadvantage.

I feel, therefore, that the system which I have the honor to present to you is all the better for not being a too easy one. For its practice, skill, patience, good judgment and taste are indispensable, but there is no good dentist who cannot, through taking each step with exactness, arrive at a perfect result with mathematical certainty. Permit me to mention some of the points of greatest importance in making inlays. The impression must be *perfect.* To this end it is necessary to prepare the cavity without undercuts and of such a form, and with such approaches, as to permit the impression to be removed without its shape being changed. It is folly to try to work with a faulty impression. No amount of skill and trouble will suffice afterward to adapt the filling to the cavity. A slight tear in the gold foil, if not at the edge, does not make a faulty impression, but any roughness of the edge or any twisting or bending make the impression useless. It is very desirable to get the edges of the cavity well defined and well polished. I have found soft iron burs of various sizes, well charged with diamond dust, most useful for this purpose. They cut rapidly and smoothly, when kept wet with water of the right temperature, and require only a light touch to do the work. Nervous patients can easily bear a diamond bur in places where the use of an ordinary bur would be impossible. If the cavity has the right shape and edges, the gold foil, often by the pressure of pieces of spunk alone, and always by the aid of the burnisher, can be so perfectly adapted to the cavity that the finished filling shows no line which can be detected by the unaided vision, if the color of the inlay is correct.

Next in order of importance comes the melting of the filling. The impression must be placed upon a pasty bed of asbestos and water, in such a manner that all parts of the gold are equally supported. It is seldom necessary to dry the asbestos before packing the filling, as it can usually be dried to best advantage at the time of first melting. It takes some experience to hold a perfectly steady flame on the handle of the melting-pan until all the moisture is gently evaporated, and then to slowly turn the heat upon the pan, and by steadiness and with patience slowly increase it until the mass is melted; but it is just here that impatient men sometimes spoil their work by filling it with bubbles. It does not matter if the mass does not flow smoothly at the first melting, or that its shape is irregular, but it must not be boiled by sudden increase of heat, for then it will be porous and no subsequent heating which the gold foil can bear will cure that defect. The same care must be exercised at the subsequent meltings, and it is desirable, and by taking sufficient pains always practicable, to get just the right size and contour, so as to avoid any subsequent grinding of the surface.

The correct setting of the inlay is also most important. It does not seem to matter much what phosphate cement one uses. The inlay must have such perfect edges that the cement cannot be dissolved out, but it must be mixed to that consistence, varying according to the case, which permits all of the surplus to be squeezed out until the joint is perfect, and which yet leaves it strong enough to hold the inlay firmly in place. The operator must be familiar with the material he is using and know how to manipulate it to best advantage. In a day when he is setting several inlays, he may, perhaps, not use cement of just the same consistence twice. It is not difficult to learn how to use any given cement for this purpose, but it must be learned or the result will be unsatisfactory.

Language fails many patients to express their gratitude for the benefits accompanying this method of treatment. Nervous and invalid patients who have writhed in helpless agony under the mallet during the packing of gold come for these inlays without dread or fear of consequences. Teeth abnormally sensitive to thermal changes, which, under gold, are occasions of permanent discomfort, become so comfortable under this treatment that the patient forgets they were ever diseased, and is not afraid to brush them even with cold water until they are clean. We have all seen decay recommence about beautiful gold fillings because the teeth were so sensitive that the patients would not keep them always clean.

Not least of all is this system to be commended for its esthetic possibilities. For inlays, for pivot teeth, and for crowns, it may be so used as to transform the appearance of the mouth by restoring form and color so completely that no evidence of art is perceptible except by careful examination.

Discussion.

Dr. Wm. Sachs, Breslau. I have always taken the greatest interest in glass fillings. If you will recollect, I spoke upon glass fillings about eight or nine years ago at Heidelberg. I experimented a great deal, as I felt the need of a material which would satisfy the patient and satisfy the dentist. I was perhaps the first to take an impression with gold foil. After a great many experiments I found it was the only correct way of getting a good impression of a cavity. I have done some very beautiful glass fillings, but the great majority were failures. After six months or a year they began to get rough on the upper surface, and the edges broke away, and I gave it up. I was very much interested in hearing that Dr. Jenkins was experimenting with porcelain enamel. I went to Dresden and saw a great number of glass fillings, and in the same mouth some porcelain enamel fillings, done a year or a year and a half, and was so much enlightened that I tried to get such an outfit. For three months I have been working with it, and my experience is that no dentist who pretends to be a modern dentist, and wishes to be at the height of his science and of artistic work, should be without the means for making these porcelain enamel fillings. I do not go quite as far as Dr. Jenkins, perhaps, but he is much more skillful than I am. I would not do it in so many places and cases, but he is able to do it in almost every cavity in the mouth. I saw it done in the second and third molars, and in places where you would think it was impossible to get at the cavity, but Dr. Jenkins did. Now I, for my own part, do not go quite so far. I select a case where I find it necessary for esthetic reasons, and use porcelain enamel for the front teeth and the labial surfaces, and in the large approximal cavities, which would show very badly if you used gold or other metal. I use it in about five or six per cent. of the fillings I am doing, and that may not seem a large number to you, but all the same I would not like to be without it, and my patients are so highly satisfied with it that they—and this is perhaps a question of some importance—will pay you almost anything you ask. It requires, perhaps, a little practice to get a good impression, but the whole thing is simple to the dentist who possesses the necessary skill to do good dental work. For my own part, I am very skeptical in accepting any new invention, and this is perhaps the first I have accepted for ten years, but I would recommend you all to try it, and you will think as highly of it as I do.

Dr. W. R. PATTON. I would like to ask Dr. Jenkins what extreme length of time he has tested the results of this since he has made the discovery of a better material than what has been used up to the present. My experience of everything that has been tried in that line so far—and particularly those of Herbst, which were advertised a great deal and brought upon the market—is that in almost every case, with a few exceptions, they become so friable, and lose their color, that they were anything but esthetic. It would be interesting to hear from Dr. Jenkins what length of time he has tested this method.

Dr. GEORGE CUNNINGHAM. I should indorse what Dr. Jenkins has said as to the tremendous amount of labor and years of experiment that the product which he has brought forward absolutely requires. With regard to the work which was done, and what Dr. Sachs has said about glass fillings, I think we may take it for granted that there is an immense amount of difference between what we will call for the time being a glass filling, and a porcelain filling. I don't know the composition of the material which Dr. Jenkins uses, but we may take it to be more in the direction of a body such as is used in continuous-gum work of a high fusing order, rather than that of a lower fusing glass material. The work done by Herbst and others was extremely useful, because that was the guiding point which led up to something which I think we have heard of to-day,—something a little less than the old Herbst body, and something more approaching porcelain work than glass work. At the same time, even in continuous-gum work, when you come to define what porcelain is, it is really a question of how much glass there is in porcelain. At present, I don't know of any continuous-gum body which does not contain a certain proportion of glass, and if the glass is of a certain character, and more especially if made of lead, then of course in a certain time you get discoloration and blackening. That is the greatest fault I find. I don't find the glass fillings to become friable, but that is a question of manipulation, and I should say that this friability and breaking away of the edges are to be traced to that cause. But the color point is provoking, and different. It is very provoking after you have made an apparently successful result and the patient is satisfied, to find after a certain time that the filling is discolored. I believe, from what I can see of Dr. Jenkins's material, that you are not likely to get any such result. I believe that the color will remain, and the only thing I would say is that it will take a number of years' experience before you can absolutely say that it will not change, and in many cases the changes are slow. In experiments which I conducted in the same direction some years ago, the result was obtained by using a certain amount of glass and coloring material as an admixture, and in that way I have been able to obtain low fusing porcelain inlays which have lasted a considerable number of years, and I can show results which have stood for eight or nine years, and which have remained perfectly sound in color. From what I have seen of Dr. Jenkins's material in the furnace, under heat, I should say that for esthetic results I have never seen anything better, and I am hopeful that the future will show its reliability.

Dr. L. A. O'BRIAN. If the two gentlemen who have just spoken had been present at the meeting two years ago, the question which they have just proposed was answered at that meeting, and was discussed at length. The material, as it is now, is quite a different thing, and was even two years ago, from what Herbst introduced. It is not merely a glass material; it is decidedly a porcelain material, although one must agree with what Dr. Cunningham says, that it is difficult to draw the line as to how much glass there is in any porcelain. As regards the changing of color, I think Dr. Jenkins will agree with me, my experience having gone along with his, that two years ago we had been making for ourselves fillings which had been perfectly satisfactory to us with the then improved material, which at that time was two years old, and which at the present time is four years old, and looks as beautiful to-day as it did four years ago. I think Dr. Jenkins will agree with me that that is a fair minimum time that we have had these fillings.

Dr. CUNNINGHAM. There is one question which I should like to ask. We will take color 18—he has a certain amount of that material in hand—color 18 or 7. Can he reproduce colors 7 and 18 with absolute certainty, giving the same color as the specimen?

Dr. JENKINS. In reply to these questions, I beg to say that the composition of the material is a complicated and difficult one. It has not been put together haphazard, but is the result of continuous experiment in various materials which have finally been brought together in such proportions as to produce the present result. Any one who has worked at all with materials of this kind, or has, above all, tried to bring the materials which are used in the production and making of artificial teeth into such a condition that they can be melted at a low temperature, is aware with what difficulty one goes step by step. For my model I took an Ash tooth, and I tried to approximate as far as possible to the character and composition of that material. In the production of the body, or in the production of a single color, a great many steps are necessary. It is not done by waving a wand or mixing drops of different liquids in a glass, but many things have to be treated separately, and finally many things have to be combined, and in these multiplied processes it often happens that something goes wrong—something with the temperature, something with the mixture, some carelessness of percentage in the grinding room, or some error of a chemical nature. So there are naturally many failures to obtain exactly what one is aiming at, but that it can certainly be done has been demonstrated over and over again. We can always obtain the same color over and over again, but there is a mass of difficulties that only a person who has occupied himself with such matters can at all understand. With regard to the permanency of the color, that is a thing, I believe, scientifically certain. I think the colors are now so arranged, I believe, they are now so thoroughly incorporated in the indestructible body, that there can be no change in the appearance of the filling after it has been placed in the mouth; not in a lifetime. I believe that to be the case scientifically; I believe it to be the case practically. The experiments that Dr. O'Brian and I have been carrying on in the mouth have been going on simultaneously with experiments in the laboratory, and we have had, of course, a whole row of ridiculous failures. We have sometimes made fillings of materials which I had fondly hoped was going to be an ideal thing, but which, even after a few weeks or a month, began to show signs of disintegration and discoloration. Dr. Cunningham has mentioned the pernicious influence of lead. The faintest trace of lead is absolutely fatal. There is no way of eliminating the discoloration which will come if there is the slightest percentage of lead in the materials used. But wherever we have approximated to the material which since a year and a half we have used, there we have always got most satisfactory results, and many of those fillings which have been in now for four years are still perfect in color. There are a good many which are defective to a greater or less degree, but whenever we find one of those fillings, if the patient will consent, we take it out and replace it by the modern ones. But the filling-material as it now exists I am absolutely confident cannot change in any conditions which can take place in the mouth, either in consistence or in color. They don't chip, as some of the hard porcelain fillings do, and they retain their polish under the use of both brush and powder. They protect the teeth from thermal changes to such a degree that if one has used them once one has no fear to continue using them. I have had repeated instances where the pulp has been badly exposed, and where, by putting in one of these porcelain fillings, the patient is unconscious within a few months that anything has ever happened to his tooth, and has not had the faintest knowledge of disturbance following. There are a great many instances of that sort that we have had within the last six months, where we have had exposed pulps in badly broken-down teeth of poor structure, but where capping and the insertion of such a filling has restored the tooth not only to a perfect esthetic appearance, so that it is really impossible to see that the tooth is filled, but where the patient is absolutely devoid of any annoyance from the capping of the pulp and the presence of the filling.

Dr. O'Brian. There is one modification I would like to make to Dr. Jenkins's remarks. It will perhaps sound a little egotistical if I say that Dr. Jenkins and myself, to my certain knowledge, can melt these fillings and produce exactly the same color every time as samples. There is one circumstance, however, under which the color can be changed, and that is in melting the inlay. It should be done carefully and slowly, and if done the way we do it—and either of us would be glad to show it at any time—the color will remain perfect. If, however, it is overfired, like any piece of porcelain that ever existed in the world, you can burn the color out of it.

Dr. Jenkins. Some of my recent experiments with pigments have brought me into possession of colors which under no circumstances will burn out, but they actually become intensified with greater heat. I am now carrying on a most interesting and important series of experiments in that direction, and I should not be at all surprised if eventually I were able to make all the colors so that the change which we call "burning-out" will not occur in any degree of heat. I hope so, and I have every reason to believe that that will be the case. But at present there are some delicate colors that will not stand too great a heat without changing.

Dr. Wetzel. I am pleased that these experiments have been crowned with so much success, but I would like to ask a few questions about the finishing of these porcelain inlays. Of course it is a very great difficulty in fixing in a porcelain inlay to see that it does not extend beyond the margins of the cavity, as it is a material which cannot be polished like gold and metal fillings, especially in approximal cavities at the cervical edge. We all know that the success of preserving the teeth depends as much upon the insertion of the filling as upon the preparation of the cavity, and, as we generally do not have sufficient room in approximal cavities to put in these porcelain inlays, I wondered how Dr. Jenkins gets at it to finish off the cervical edge of such fillings. I put in porcelain inlays eight years ago, and they could be ground off with stones and disks, but I don't know how it is with these fillings of Dr. Jenkins, whether they can be polished off with emery paper.

Dr. Jenkins. The art is, as I have said in my paper, to get first a perfect impression. It is then a mere matter of experience to melt the porcelain enamel until it goes exactly where you want it. It flows so slowly that you can get the desired contour; it flows with such certainty that you can approximate to any line, however fine. If by any mischance there is an edge to the filling, and it is necessary to take away some of the polished surface which is left after melting, it can be perfectly well done. It can be ground and polished like an Ash tooth, if the melting has been properly done. That is a matter of very great importance, but we who are most used to and familiar with its working prefer to so perfectly graduate the amount of the material that, after the final melting,—three of which are usually necessary for any inlay,—there is absolutely nothing to be removed; and should there be anything to be removed it may be polished off with a diamond disk, or with sandpaper, or what one pleases.

(To be continued.)

QUONEHTACUT DENTAL CLUB.

The fifty-fourth anniversary of the discovery of anesthesia by Horace Wells was observed by the Quonehtacut Dental Club at Hartford, Conn., with a banquet and annual meeting on Saturday evening, December 10, 1898. Dr. Charles C. Barker, of Meriden, was elected president of the club.

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DENTAL SOCIETY ANNOUNCEMENTS.

THE FRENCH INTERNATIONAL DENTAL CONGRESS.

Following an invitation addressed to the members of l'Ecole Odontotechnique by the initiative committee appointed by l'Ecole Dentaire de Paris, a meeting was held in the rooms of the said college on June 26, 1898. Thirty-four members of the profession were present, of whom seventeen represented l'Ecole Dentaire de Paris, five members chosen from the council of directors of the dental schools and dispensaries of Paris, four members chosen from the Société d'Odontologie de Paris, eight provincial members delegated by the council of direction of l'Association Générale des Dentistes de France, and seventeen members representing the members of l'Ecole Odontotechnique.

After an explanation of the reason for the meeting, a historical minute of the initiative committee was made by M. Godon. The assembly decided upon a provisional committee of organization, the *rôle* and duties of which were defined as follows: To draft a code of rules; to request the concurrence of the dental societies of France, and that they appoint one member as delegate for every twenty active members, or fraction of twenty members, to open communication with professional societies, both foreign and local, for the purpose of promoting the formation of committees of organization in their respective countries; finally, to arrange a meeting of the general assembly of delegates in March or July, 1899, to constitute the definite committee of organization.

The provisional committee is composed of the following names: MM. Lecaudey, honorary president; Ch. Godon, president; Dr. Queudot, Ducournau, Dr. Martin, Schwartz, vice-presidents; Viau, treasurer; Dr. E. Sauvez, secretary-general; Burt, D'Argent, Hivert, Dr. Maire, Martinier, Siffre, secretaries; Rodolphe, assistant treasurer.

E. SAUVEZ, *Secrétaire-général.*

For particulars address Dr. E. Sauvez, 17 Rue de Saint-Pétersbourg, Paris.

NATIONAL DENTAL ASSOCIATION—SOUTHERN BRANCH.

THE Southern Branch of the National Dental Association expects to hold its next annual meeting at New Orleans, La., convening February 9, 10, 11, and 13, 1899. Owing to some misunderstanding, the regular announcement has been delayed, but will be published in the February journals, also issued early in January. C. L. ALEXANDER, *Cor. Sec'y., S. B. N. D. A.*

OHIO STATE DENTAL SOCIETY.

THE officers of the Ohio State Dental Society for 1899 are as follows: L. P. Bethel, Kent, president; L. L. Barber, Toledo, first vice-president; H. F. Harvey, Cleveland, second vice-president; S. D. Ruggles, Portsmouth, secretary; C. I. Keely, Hamilton, treasurer.

S. D. RUGGLES, *Secretary.*

WISCONSIN STATE BOARD OF DENTAL EXAMINERS.

THE Wisconsin State Board of Dental Examiners will hold its next session for examination of candidates who wish to practice on Tuesday, January 17, 1899, at 9 A.M., at the Hotel Pfister, Milwaukee.

W. H. CARSON, D.D.S., *Sec'y.,*
609 Goldsmith Bldg., Milwaukee, Wis.

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EDITORIAL.

THE PARIS INTERNATIONAL DENTAL CONGRESS.

WE publish elsewhere in this issue a report of the initial organization which has been effected for the purpose of holding an International Dental Congress at Paris in 1900, during the time of the Exposition.

The National Dental Association, at its Omaha meeting, appointed a committee for the purpose of securing an adequate representation of American dentistry at the Paris Congress, and the profession of this country are by that action officially committed to a pledge of co-operation in the movement to make the Congress a success. It is taken for granted that the action of our national body in this regard will meet with general approval, for the reason that the purpose of an international dental congress is one to which no exception can be taken, and its results are of benefit to the entire body of dental practitioners throughout the world. To American practitioners the invitation to take an active part and be adequately represented in a movement of this character is always welcomed, for the reason that in America dentistry has had its most active development, and American methods have made the deepest impression upon the growth of dentistry as a whole; facts of which the American practitioner is naturally proud, and which he is always glad of an opportunity to emphasize. An international gathering furnishes such an opportunity, and there can be no doubt that it will be utilized. It is not that American dentistry shall be represented at the Paris Congress which should concern us, however, so much as the problem of how it shall be represented. Great opportunities always imply great responsibilities, and our experiences in similar affairs in the past should teach us not only to accept this one *cum onere*, but enable us to avoid the unfortunate results of previous errors.

Among the many results which should be secured by the holding of an international dental congress are two,—viz, that it should adequately set forth the maximum development of dental science and art at the time when the Congress is held, and exert a civilizing influence professionally, in the broadest sense of the term, by free interchange of the best thought in matters concerning our specialty. Have these results been attained in the fullest degree as an outgrowth of similar congresses heretofore held? While much good has been accomplished, there is undoubtedly ample room for improvement. One of the great misfortunes in the holding of the World's Columbian Congress in Chicago in 1893 was that the world's dentistry was not in all cases adequately represented. The blunder which led to the withdrawal of the British Dental Association from active official participation in that meeting was most regrettable, and, though at the time a correction of the error was apparently not possible, it was due to causes which could have been avoided, and which prevented the establishment of a better mutual understanding of national conditions and our international relations in dentistry even yet needed.

Much of the criticism and dissatisfaction at times expressed as between the profession of this and other countries is the outgrowth of the need for a better mutual understanding of existing conditions and methods. As it is the function of an international congress to supply the opportunities in the directions here indicated, it should be the care of those having charge to see to it that the profession of their respective countries is represented and not misrepresented.

The occasion is one which transcends individual interests, and these should therefore be made subservient to the general good. An examination of the constitution of the provisional organization in France will show that the whole professional body of that country is enlisted in support of the movement. Sectional differences have been set aside, and a union of forces has been formed for the advancement of professional interests. A like spirit should animate the work of representing American dentistry at the Paris Congress. The committee in charge should have full power, and, having the power, should exercise it to exclude all matter irrelevant to the purpose, or which does not in its degree represent American dentistry at its best. The crank, the faddist, the empiric, the charlatan, and the omnipresent individual who, with the courage of his ignorance, proclaims his discovery of a principle which inverts the order of nature within his particular field of observation, are features which should be omitted.

The Paris Congress will afford opportunity for investigation and interchange of thought along dental educational lines. Europe does not clearly comprehend our educational system, nor do we properly understand that of Europe. The legislative control of dental education in this country, and the detailed methods employed in training dental practitioners, are features which are of vital professional interest, and provision should be made for their comprehensive exposition for the benefit of our European *confrères*. If the dental educational problem is made a prominent factor of the congress much good will result to all concerned, as each has much to learn from the other; and the tendency would be to bring our educational systems into more harmonious relations, and avoid much of the friction incident to the differences which now exist.

If we are to make the best of this opportunity, if we propose to defend the proposition so frequently and often so flippantly expressed, that "American dentistry leads the world," by a presentation of evidence to that end at the Paris Congress, the work of preparation should begin now. The time intervening should give opportunity for the research and study needed to produce results worthy of the occasion, and is not more than adequate to insure a proper exposition of American dental progress as well as an appreciative return of the cordial and practical interest manifested by our French colleagues in the success of the World's Columbian Dental Congress in 1893.

PUBLISHER'S NOTICE.

THE DENTAL COSMOS FOR 1899.

WITH this issue the DENTAL COSMOS enters upon the XLIst consecutive volume of its publication. The past year it has largely exceeded its promise to subscribers in the amount of matter supplied them. It begins the new volume with an excess of sixteen pages over the regular number in this issue. The prospects are that this overplus of matter will continue for some time.

This may be considered a sort of commentary on the solemn declaration some years ago of the editor of one of our esteemed contemporaries, that the dental profession was "written out." The pages of the DENTAL COSMOS from that time to now are a standing refutation of this dictum.

As to the character of the reading matter which appears in the DENTAL COSMOS, it continues to be of the kind which makes the history of the practice of dentistry; reflecting the advances and the aspirations of the profession. Look in the papers read before your societies and see how often the DENTAL COSMOS is referred to, if you seek confirmation of this statement.

The reading pages of the DENTAL COSMOS will continue to be the forum from which speaks the dentist who has a message for his fellows; and his message will be clothed as it should be to make it most impressive. We call attention to the elaborate character of the illustrations which have helped during the past year to an understanding of the text. Wherever illustration will help to a clearer comprehension of a writer's statements, the illustrations will be supplied without stint. In this feature the DENTAL COSMOS has never been approached by any other dental magazine.

One other feature of the DENTAL COSMOS is worthy of mention here—its advertisements. They are always clean,—no claptrap,—they are always dental, they show more new and improved devices for the betterment of dental practice than those of all other dental magazines combined, and though they are not the least valuable feature to the subscriber, they cost him nothing.

Subscription price, $2.50 a year to the United States, Canada, and Mexico; $3.00 a year to other U. P. U. countries; half a year half price. Always in advance.

Subscriptions may be sent direct to any of our houses or through your local dealer.

THE S. S. WHITE DENTAL MFG. CO.,
Publisher.

HINTS, QUERIES, AND COMMENTS.

To the Editor of the Dental Cosmos:

Sir,—I do not remember having seen one word of warning in the dental journals against the use of so-called cheap dental vulcanite for plates.

In many localities the poorer grades of rubber are used with few or no exceptions. I have discovered only two reasons to account for the fact. One is to save the difference in price, which is too ridiculous almost for belief, being about five cents a plate; the other "reason" is that the higher grades are so tough and difficult to finish up.

I said there was about five cents difference in the cost. Not always. I have tested some rubbers sold at a low price that were so heavy that the cost of a plate was more than if made of the higher lighter grades.

The "cheap" rubber plates must be thicker than the better grade, which, added to the extra weight when bulk is equal, makes a plate far more difficult to keep in place if the plate is an upper one. For partial sets plain teeth standing alone cannot be made to stay on a cheap rubber plate, while if of the best grade they will be entirely practicable.

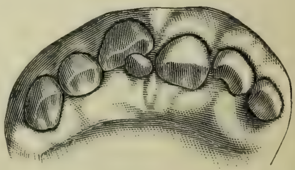
Cheap rubber is so much harder to press into shape for plates that the percentage of teeth broken in the process makes it far more costly than the more pliant high-grade rubber. This breakage of gum teeth accounts largely for the vast number of hideous exhibitions of so-called pink rubber used in front of plates with plain teeth. This pink rubber is far from pink or any real imitation of gum color when used awhile, and never fails to expose the fact that the wearer has "false teeth." The cheap rubbers, when partially vulcanized, which is often the case, carry a far larger amount of filth of every kind, even though some effort is made to cleanse them. High-grade rubber plates are flexible to a degree that is of real advantage, while the cheap grades will break if made thin enough to spring in use.

If I am correct in my claims, not another pound of anything less than the best quality of dental rubber should ever be sold to the dental profession, cheap rubbers being such an imposition upon the people as to justify legislation to prevent their use. W. E. Driscoll.

Manatee, Fla.

To the Editor of the Dental Cosmos:

Sir,—Allow me, as a matter of record, to report through the columns of the Dental Cosmos a case of a supernumerary deciduous central incisor. The mother of the child claims the supernumerary tooth erupted before the incisor. The little boy is now two years old, a cast of whose anterior upper teeth I send you for illustration.



Philadelphia, Pa. Paul Voigt.

To the Editor of the Dental Cosmos:

Sir,—The following description of two cases of fracture of the superior maxilla may possibly be of interest:

A prominent physician who spends the winters here was unfortunate enough to have a collision with a "scorcher," the "scorcher's" head striking his cheek with great violence, fracturing and driving the plate of bone inward and downward from the malar process, and antero-posteriorly from canine eminence to the tuberosity.

The physicians in charge found that the parts could not be pressed in place owing to the extreme rigidity; the plate of bone being seemingly bent as well as fractured. I was called in by one of the attending physicians and found the conditions as above described. Owing to the malocclusion, as a result of change in position of injured parts, there was a space of half an inch between upper and lower jaws (in the region of the incisors) when closed as far as possible. The third molars on the injured side were the only occluding teeth, the buccal cusps of the upper striking lingual cusps of the lower.

The case was a peculiar one. It was simply impossible with the utmost pressure to bring the parts into correct apposition. This was repeatedly tried by four or five physicians who were called in before me, and also by myself. The case was turned over to me and I proceeded as follows:

A correct impression of the mouth was obtained in modelling compound, and from this a plaster model. A plate of vulcanite was made to cover the roof of the mouth, and all of the teeth posterior to the cuspids. In the lingual surface of the plate I vulcanized a double loop ("Coffin") spring of stout piano-wire. The plate was cut with plate saw antero-posteriorly and just below the gingival line on the injured side. The spring was opened enough to give considerable lateral pressure. On trying in, the appliance was found to fit accurately, tight enough to remain in position, yet could be removed without difficulty for cleansing.

The patient was instructed to exert upward pressure by closure of the jaw, and the lateral pressure of the spring was increased every few days. The appliance was worn with comfort, and at the end of two weeks the articulation was perfect. The plate was worn a few weeks longer as a retaining appliance.

The second case was of a young man who had a violent fall on a "chute." The upper incisors were prominent and with very long roots. The force of the fall drove them (two centrals and a lateral) upward and outward, fracturing the alveolus in a terrible manner, one piece being turned entirely over upon itself and hanging by a shred of the gum. All semblance to sockets was entirely obliterated. The teeth were found, and strange to say were uninjured. The case presented immediately after the accident.

I washed out all small loose particles of bone with warm antiseptic water, and carefully put in place the fractured parts. Thorough antiseptic treatment was used until the parts healed.

The nature of the fracture rendered it impossible to replace the teeth at the time, and they were kept in hydronaphthol solution for about four months. Then, with trephines and reamers sockets were formed in the now fairly firm process, the ends of the roots were cut off, and pulp-canals filled. The teeth were then placed in their respective sockets and wired firmly to a splint. I used every antiseptic precaution as to hands, instruments, etc. There was little swelling or inflammation.

The splint was kept in for about five months, when the teeth were found to be firm, and so far the operation is a success. The work was done about a year ago.

L. C. ELKINS.

ST. AUGUSTINE, FLA.

A MONTHLY BIBLIOGRAPHY OF DENTAL LITERATURE.

COMPILED BY J. MELVIN LAMB, M.D., D.D.S., WASHINGTON, D. C.

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LIST OF UNITED STATES PATENTS

PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING NOVEMBER, 1898.

November 1.—Design pat. No. 29,560, to Geo. E. Greene. Handle for dental pluggers.
" *8.*—No. 613,711, to Alfred Page and Samuel S. Bloom. Mold for artificial teeth.
" " No. 613,772, to John W. Moffitt. Dental articulator.
" " No. 613,842, to John A. W. Lundborg. Bracket attachment for dental chairs.
" " No. 613,947, to Joseph M. Strout. Dental matrix-retainer.
" *15.*—No. 614,246, to Edmund D. Gilbert. Vulcanizer.
" " No. 614,376, to Walter V. Elliott. Dental plugger.
" *22.*—No. 614,723, to John H. Jackson. Dental tool.
" *29.*—No. 614,829, to Charles Brown. Dental engine.

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ORIGINAL COMMUNICATIONS.

THE FIBERS AND GLANDS OF THE PERIDENTAL MEMBRANE.

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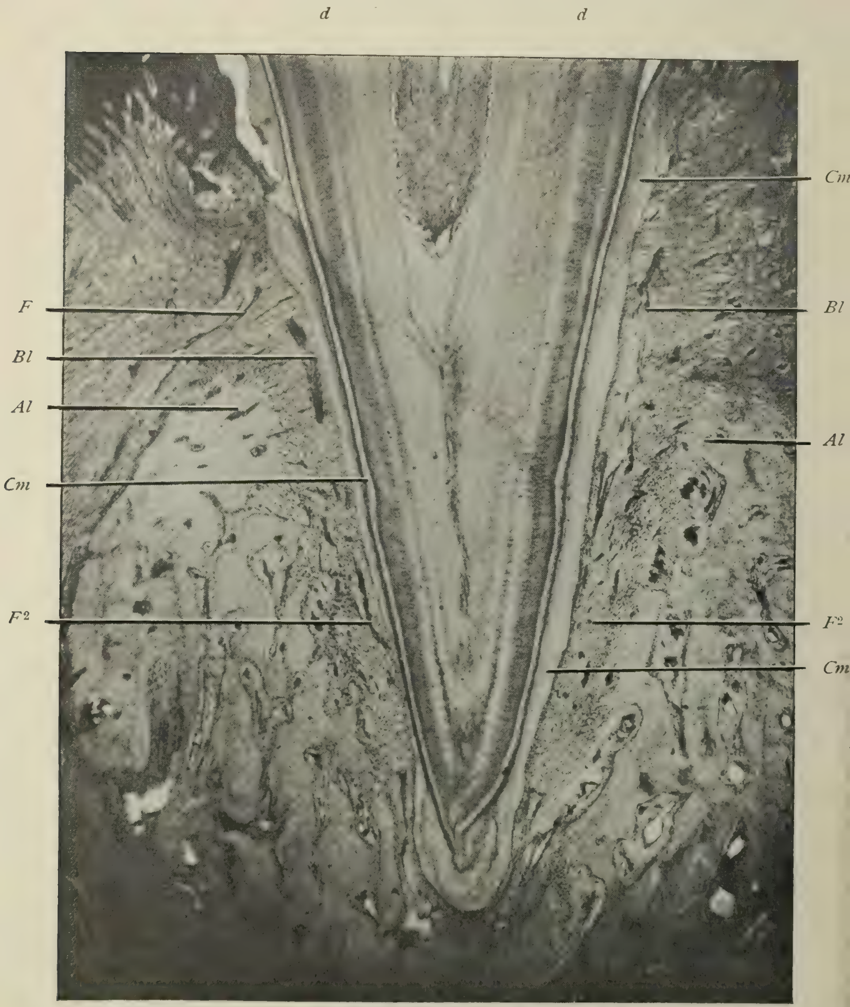
Illustrated by photo-micrographs by FREDERICK B. NOYES, A.B., D.D.S., Professor of Histology in Northwestern University Dental School.

THE interest manifested in the diseases of the peridental membranes has increased steadily within the last fifteen years, if we may judge of it by the number and character of the articles and discussions touching upon that topic in our journals and society meetings. The importance of these diseases merits still greater interest than has yet been manifested. It has seemed to me curious that the studies of the diseases of this tissue have not led to closer studies of its histological elements. In 1887 I published my studies of the periosteum and peridental membrane in book form, in which the elements of these tissues were given in detail as I then understood them. This work has passed almost without notice, while the purest speculative reasoning upon the diseases of this structure has continued. Some persons of reputation in histological investigation have hinted that I had drawn upon my imagination in my illustrations and delineations, and especially with regard to the glands which I then described. This lack of confidence I had hoped would be dispelled by examinations of this tissue by others, but, since article after article has appeared without this, and very recently a large work, a considerable portion of which is devoted to dental histology, has appeared without any adequate description of this membrane and no notice of its glands, I determined to publish some of the photo-micrographs that I and those associated with me use in teaching. These photo-micrographs have been produced by Dr. Frederick B. Noyes, Professor of Histology in Northwestern University Dental School, in part from my own slides and in part from slides that have been made in the class work in dental histology. No retouching whatever has been done.

The study of the histological characters of this membrane must

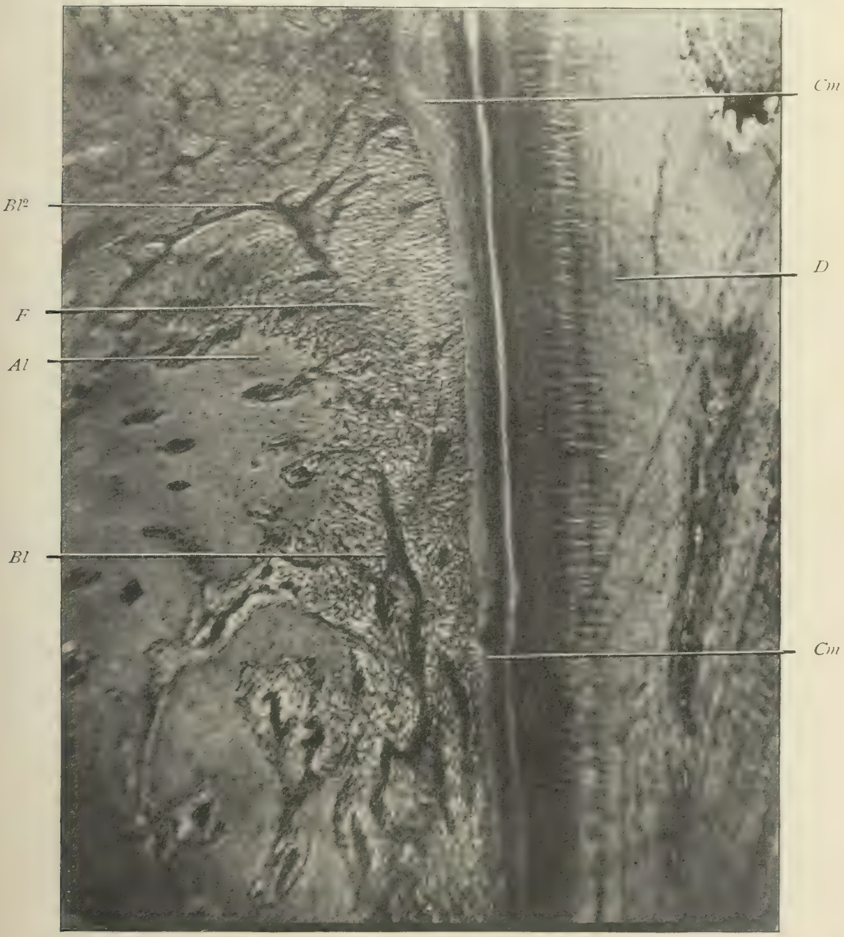
FIG. 1.



Lengthwise section of tooth, alveolus, and alveolar wall, showing fibers of the peridental membrane. *F* and *F*², fibers of membrane; *Al*, *Al*, alveolar process; *Cm*, *Cm*, cementum; *d*, *d*, dentin; *Bl*, *Bl*, blood-vessels.

be reckoned as difficult, for the reason that it is situated between calcified tissues; yet when proper methods have been successfully applied it becomes easy enough, so that afterward moderately good sections can be produced in large numbers. Really good sections for photo-micrographic work are much more difficult to obtain, because we need a happy combination of a very thin section and the tissue cut in such relation to its fibers and glands as to display them. For the most part it has been found best to so prepare the sections as to show the fibers in some by diffusive staining, and the glands and interfibrous tissue in others by selective staining.

FIG. 2.

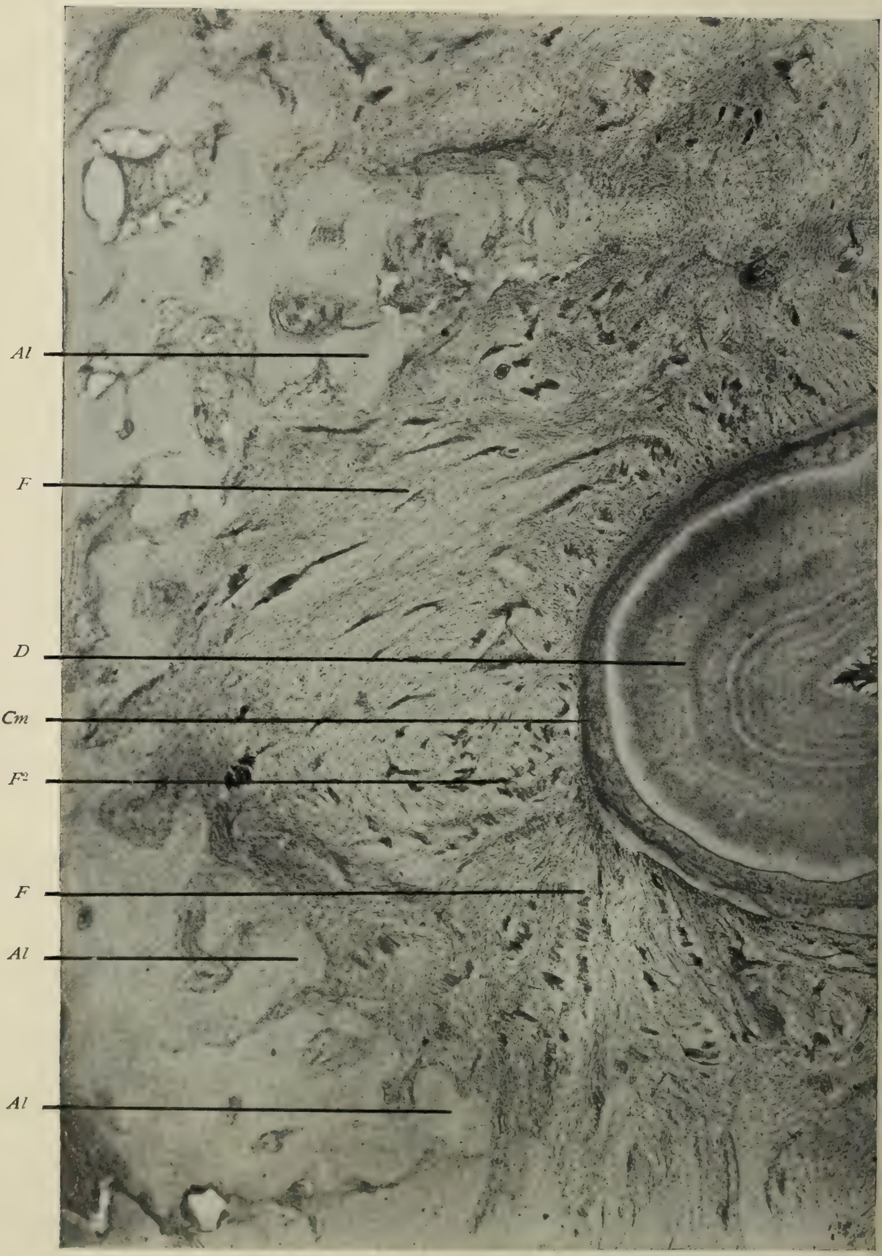


Fibers of the peridental membrane at crest of the alveolar process. *D*, dentin; *Cm*, *Cm*, cementum; *F*, fibers of the peridental membrane stretching across from the cementum to the alveolar wall; *Bl*, *Bl*, blood-vessels.

Thus the glands and interfibrous tissue seem to disappear in one section while prominently displayed in the next section of the series. It may be of interest, first, to briefly examine the fibers by which the tooth is fixed in position.

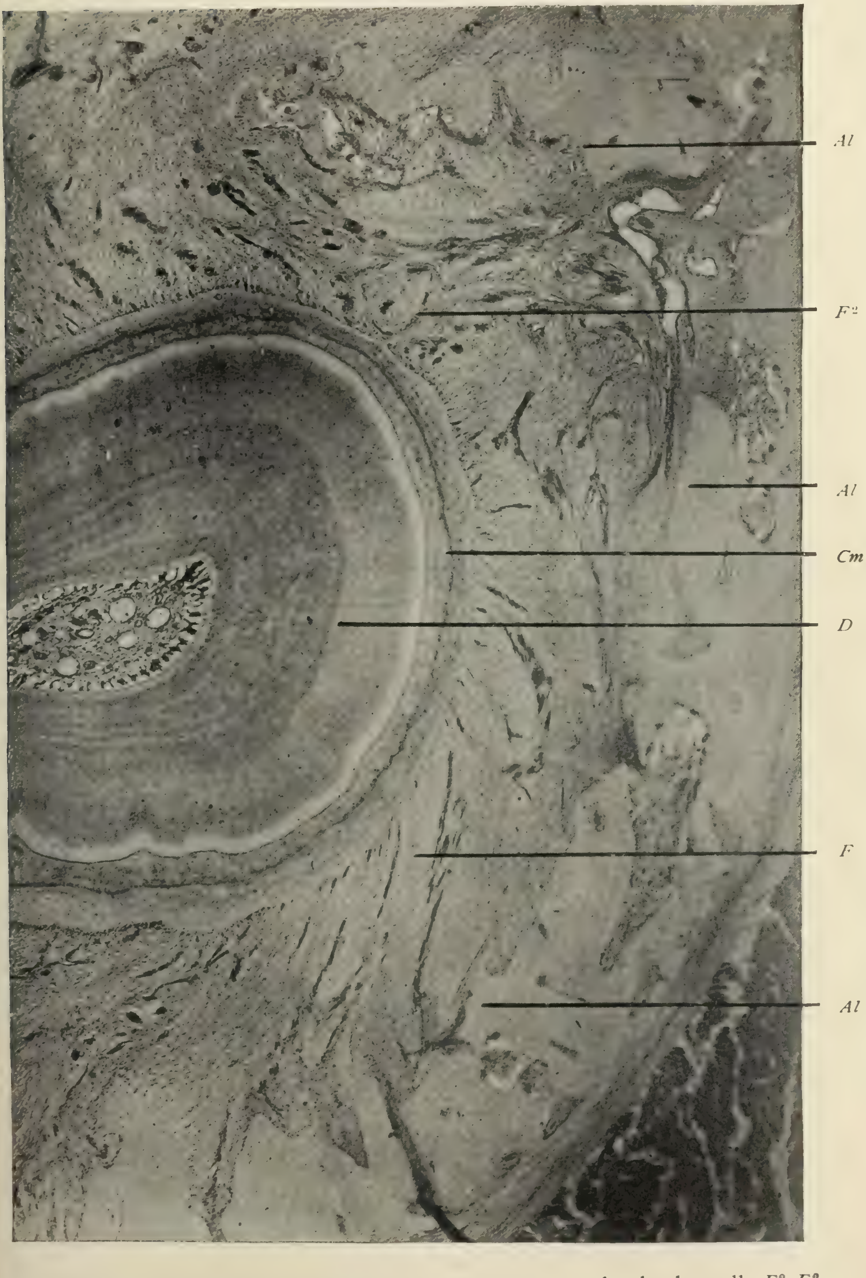
Fig. 1 is from a lengthwise section through the root, alveolus,

FIG. 3.



Figures 3 and 4 are the two halves of a large photo-micrograph from a cross-section of the root, alveolus, and alveolar process of an incisor, showing the fibers of the peridental membrane. *D*, *D*, dentin of root of tooth; *Cm*, *Cm*, cementum; *Al*, *Al*, alveolar process;

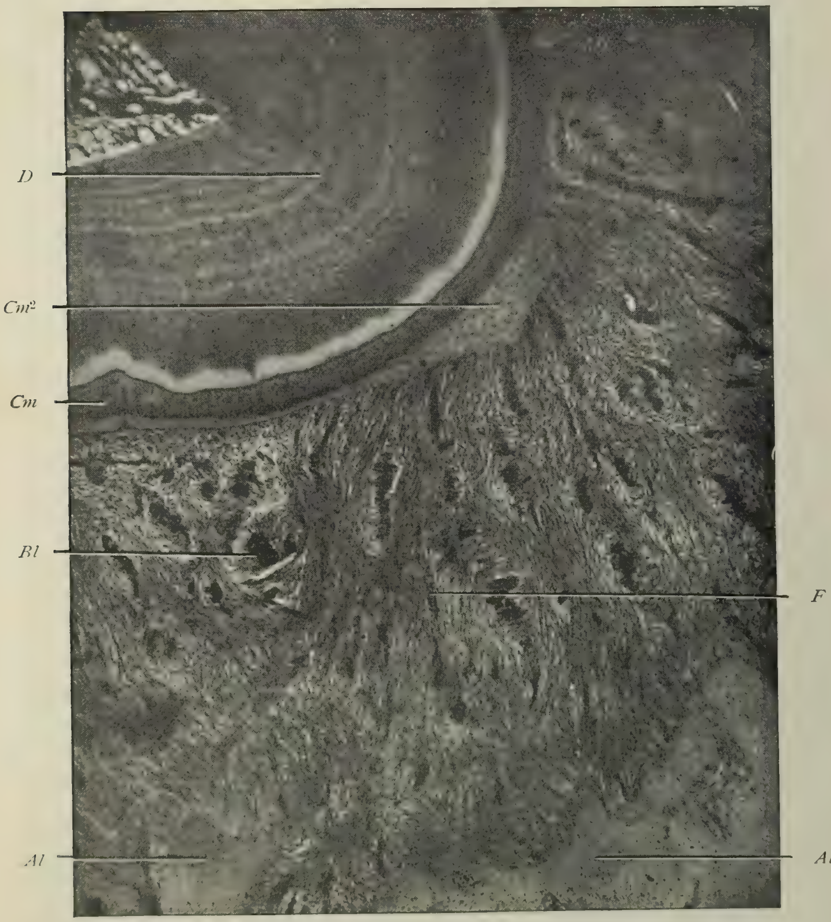
FIG. 4.



F, *F*, fibers of peridental membrane passing from the cementum to the alveolar wall; F^2, F^2, bundles of fibers cut across. Many small blood-vessels cut across appear.

and alveolar process of an incisor. The cut is not exactly parallel with the long axis of the tooth. The diffusive fiber staining has given the fibers fairly well, even with the very low power used. Upon the sides of the root in the apical half of its length it will be seen that the fibers leave it and run diagonally outward and crownward, and are inserted into the alveolar process (*F^2* and *F^2*). As the crest of the alveolar process (*Al* and *Al*) is approached, the direction of the fibers is so changed that they run squarely across from the tooth to the alveolar process. Still farther toward the neck of the tooth strong fibers run from the tooth out over the crest of the alveolar process to join the perios-

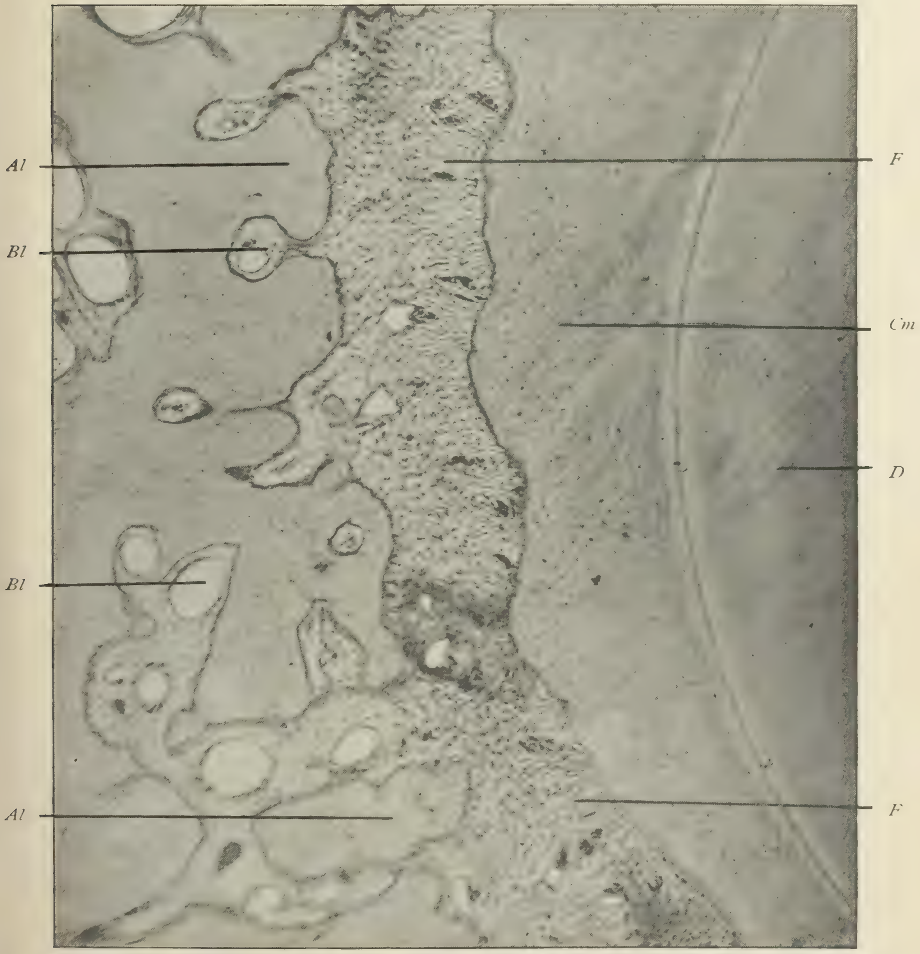
FIG. 5.



Linguo-distal portion of cross-section of the root of an incisor, alveolus, and alveolar process, showing fibers of the peridental membrane passing from the cementum to the alveolar wall. *D*, dentin of root; *Cm*, cementum; *Al*, *Al*, alveolar process or wall; *Cm^2*, thickened portion of cementum; *F*, fibers of peridental membrane; *Bl*, blood-vessels.

teum and the strong fibrous tissue of the gums *(F)*. At a number of points blood-vessels of some size will be noted within the membrane *(Bl, Bl)*. This arrangement of the fibers seems well calculated to support the tooth in its alveolus.

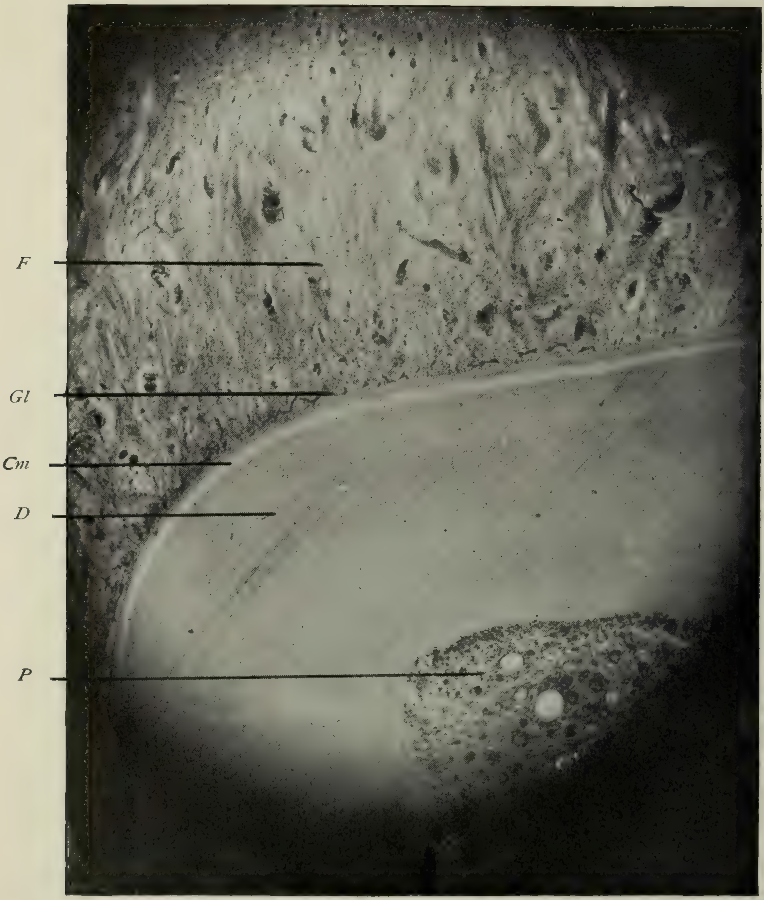
FIG. 6.



Peridental membrane from an old animal. *D*, dentin; *Cm*, thick cementum; *F*, *F*, fibers of peridental membrane; *Al*, *Al*, alveolar wall; *Bl*, *Bl*, blood-vessels within the bone.

Fig. 2 is from another section of the same series with the first, but showing only a small area which includes the crest of the alveolar process *(Al)*. This is a stronger photograph, in which the fibers are better displayed. The ends of the principal fibers are built into the cementum on one side, and into the bone on the other. In fact, the fibers were there before either the bone or cementum, and in their growth the cementum and bone are built around them, and the ends of the fibers included in each become calcified. It is in this way that these principal fibers are made fast and sustain the tooth. A number of blood-vessels *(Bl)* are included in this illustration, the tissues of which, with the interfibrous tissues about them, have taken a dark stain. One of these *(Bl²)* arches over the crest of the alveolar process to enter the periosteum on its outer surface, and sends branches toward the gingival border.

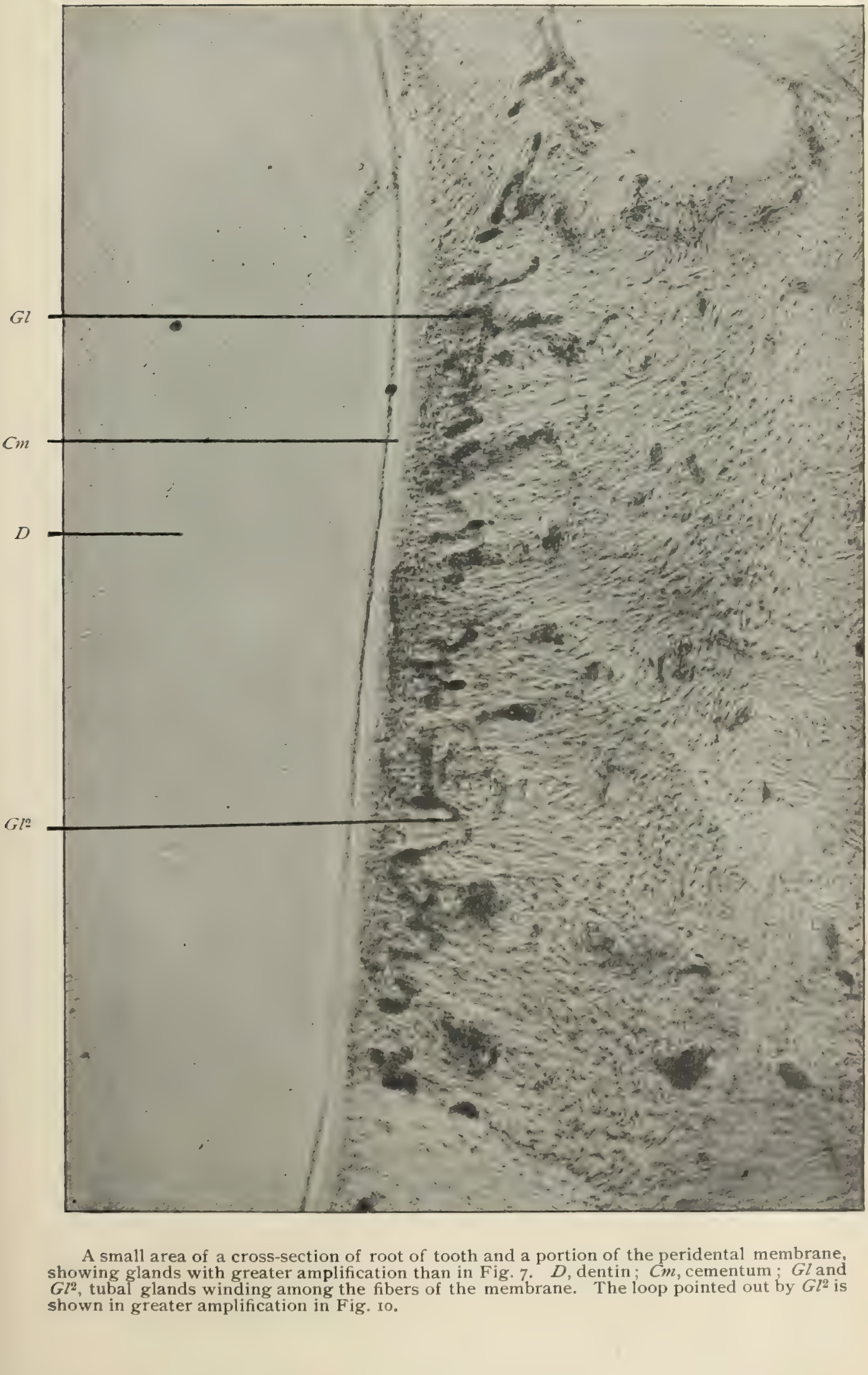
FIG. 7.



Cross-section of root of incisor and portion of membrane, showing glands of peridental membrane with a low power of the microscope. *P*, pulp of tooth; *D*, dentin; *Cm*, cementum; *F*, fibers of peridental membrane; *Gl*, glands of peridental membrane showing as irregularly broken dark lines close to the cementum.

Figs. 3 and 4 are the two halves of one large photo-micrograph from a cross-section of the root of an incisor with its alveolus and

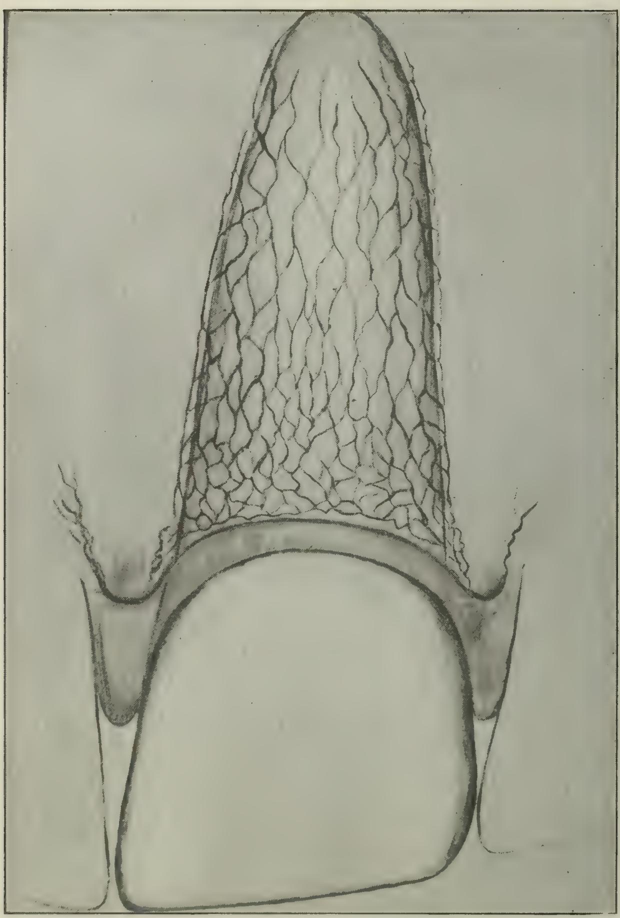
FIG. 8.



A small area of a cross-section of root of tooth and a portion of the peridental membrane, showing glands with greater amplification than in Fig. 7. *D*, dentin; *Cm*, cementum; *Gl* and *Gl*², tubal glands winding among the fibers of the membrane. The loop pointed out by *Gl*² is shown in greater amplification in Fig. 10.

alveolar process. The section is taken from the junction of the middle third with the gingival third of the root. In this two very distinct laminæ of cementum *(Cm)* appear, the outer one varying much in thickness at different points. In many parts of the picture the direction of the fibers passing from the cementum to the walls of the alveolus is well shown, and it will be noted that many of the fibrous bundles vary considerably from a direct course *(F* and *F)*. Many of the bundles are not parallel with the plane of the section, and are cut across *(F^2* and *F^2)*. This is seen mostly upon the lingual and distal sides of the root.

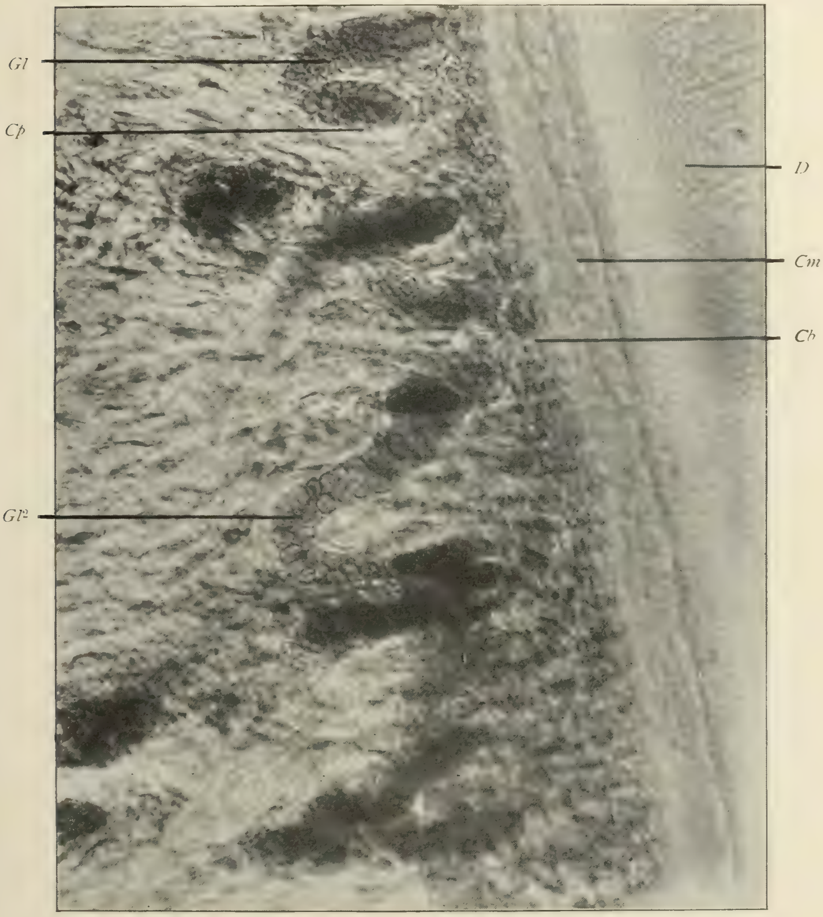
Fig. 9.



Diagrammatic illustration of the position and distribution of the glands about the root of an incisor.

Fig. 5 is from another section of the same series as the last, with a greater amplification. The illustration includes the linguo-distal quarter of the root and membrane (the section was mounted the other side up). In this the penetration of the fibers into the thickened portion of the superficial layer of cementum is readily seen at Cm^2, and somewhat less readily traced into the bone of the alveolar wall (*Al* and *Al*). The blood-vessels are numerous in

FIG. 10.

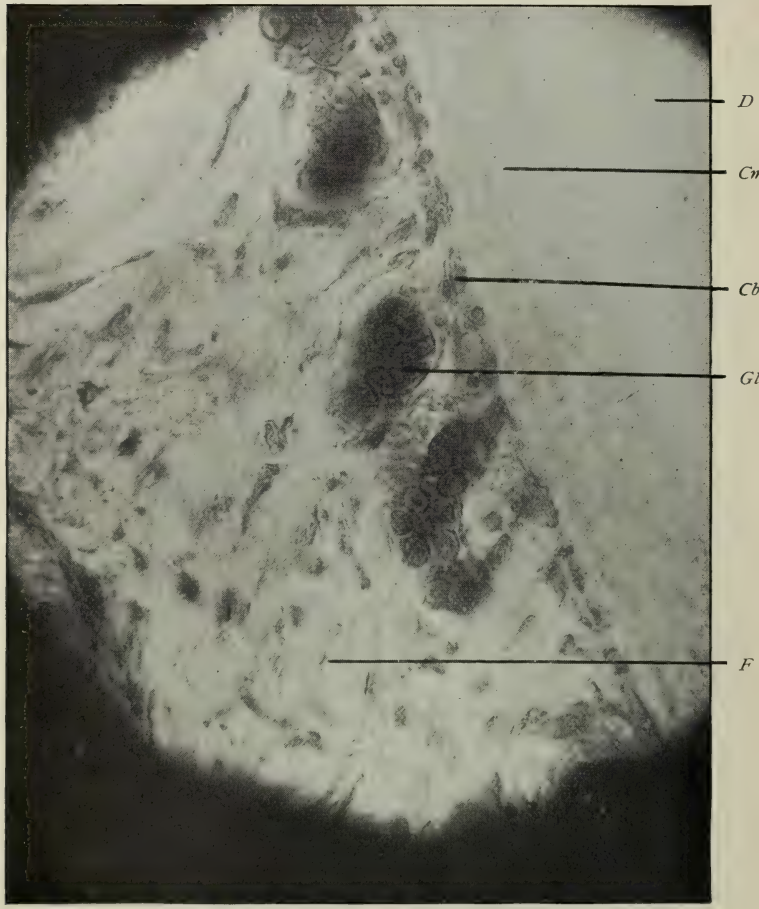


Glands of peridental membrane shown with a 12th-inch lens, in which the characters of the cellular elements appear. *D*, dentin; *Cm*, cementum; *Cb*, cementoblasts; *Gl* and Gl^2, loops of glands in focus, showing the cells,—Gl^2 is the same loop pointed out by Gl^2 in Fig. 8; *Cp*, hyaline capsule inclosing gland, which also appears about Gl^2.

this picture, winding among the fibrous bundles, but mostly cut across. These pictures are from the sheep, and the membranes are rather thicker than in man, even in youth, and much thicker than the healthy membrane in old people.

Fig. 6 shows the membrane and a portion of the root and alveolar process from an old animal. It will be noted that the cementum *(Cm)* is very much thickened. The fibers *(F, F)* run nearly straight across to the bone, and the blood-vessels *(Bl)* are mostly within the bone. The cementum has thickened by growth, and the bone has grown in closely upon the root of the tooth, thinning the membrane and including the blood-vessels within the bony wall.

FIG. 11.



Glands lying among the large white fibers of the peridental membrane, showing the nuclei of their cells. *D*, dentin; *Cm*, cementum; *Gl*, gland-cells with nuclei; *F*, white fibers. A number of connective-tissue cells also appear.

THE GLANDS.

For the photo-micrographic illustration of the glands of the peridental membrane differential stainings have been employed, which show the interfibrous tissue rather than the fibers.

Fig. 7 shows a portion of the tooth's root and membrane with a low power, in which the glands appear as fine irregularly broken dark lines *(Gl)* close along the margin of the cementum *(Cm)*.

Fig. 8 shows these glands *(Gl* and *Gl*^{2}*)* in greater amplification clustered among the principal fibers of the membrane, close along the cementum *(Cm)*. In either of these illustrations these glands might readily be mistaken for a plexus of blood-vessels, but close observation of the last picture will show their cellular elements to be of a different kind. They encircle the root of the tooth, near the gingival portion, often in the profusion shown in this illustration, often more sparsely, and become less thick progressively toward the apical end. They are branched and connected in every direction, but their most general course is lengthwise the root, as shown in diagram in Fig. 9. In proceeding toward the gingival border they cease suddenly in a rather thick mass just before reaching the level of the gingival line.

In the diagram, Fig. 9, I have illustrated the arrangement of these glands as they have appeared to me from the examination of a multitude of sections.

As these glands wind about among the principal fibers, it is impossible to have any considerable length of them in one focus in photographing with higher powers. We must, therefore, depend upon catching some small portion of a loop in focus in order to show their cellular characters. This Professor Noyes has done in the next following illustrations.

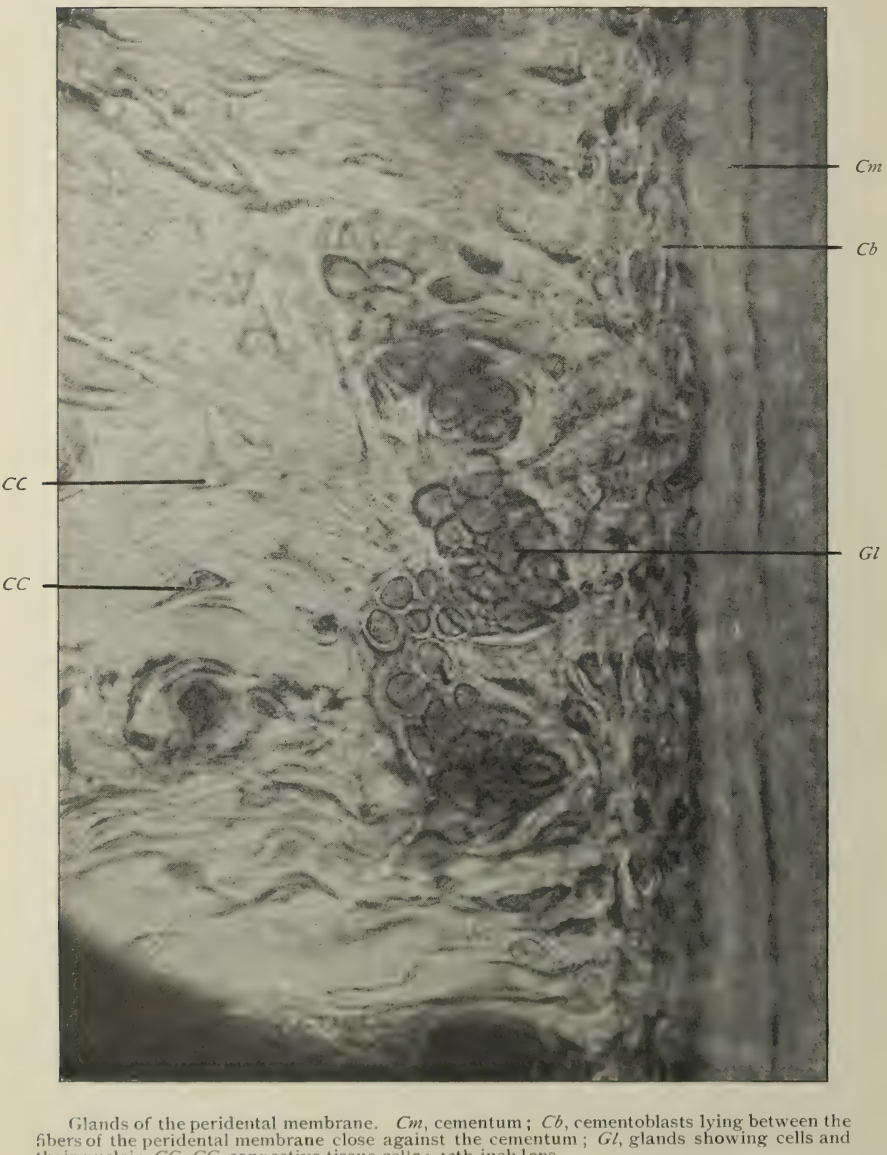
Fig. 10 shows one of these loops in focus in the central portion *(Gl*^{2}, and same loop as *Gl*^{2}, Fig. 8*)* and another in the upper part of the field *(Gl)*, while in other portions the loops of the glands are a little out of focus. The cementoblasts *(Cb)* lying close against the cementum *(Cm)*, between the principal fibers, appear somewhat indistinctly. In the central loop of glands *(Gl*^{2}*)* in focus the cellular elements appear very distinctly, and in some of these the nuclei also appear, showing clearly the character of the elements of which the structure is made up. About the loop *Gl* in focus, in the upper part of the field, the hyaline membrane *(Cp)*, inclosing the cellular elements, appears prominently. This can also be traced about the loop *(Gl*^{2}*)* in the central portion.

In Fig. 11 the nuclei of the gland-cells appear more prominently, and at some points the inclosing membrane also appears. The cementoblasts *(Cb)* are well seen lying between the large white principal fibers close against the cementum.

Fig. 12 gives another good view of the gland-cells *(Gl)* and an excellent showing of the cementoblasts *(Cb)*, taken from near the mid-length of the root of the tooth. The plane of the section is not perpendicular to the surface of the root, which causes the cementoblasts to appear as if in several layers.

These glandular loops are often crowded between the fibers in such a manner as to appear in the most diverse shapes in sections. Fig. 13 shows something of this, but some of the more extreme forms produced in this way are shown in Fig. 14, in which the glandular elements are at some points so crowded between the large white fibers as to appear in a double row *(Gl*^{2}*)*. Some of these appear to be in contact with the cementoblasts, though I think this does not actually occur.

FIG. 12.

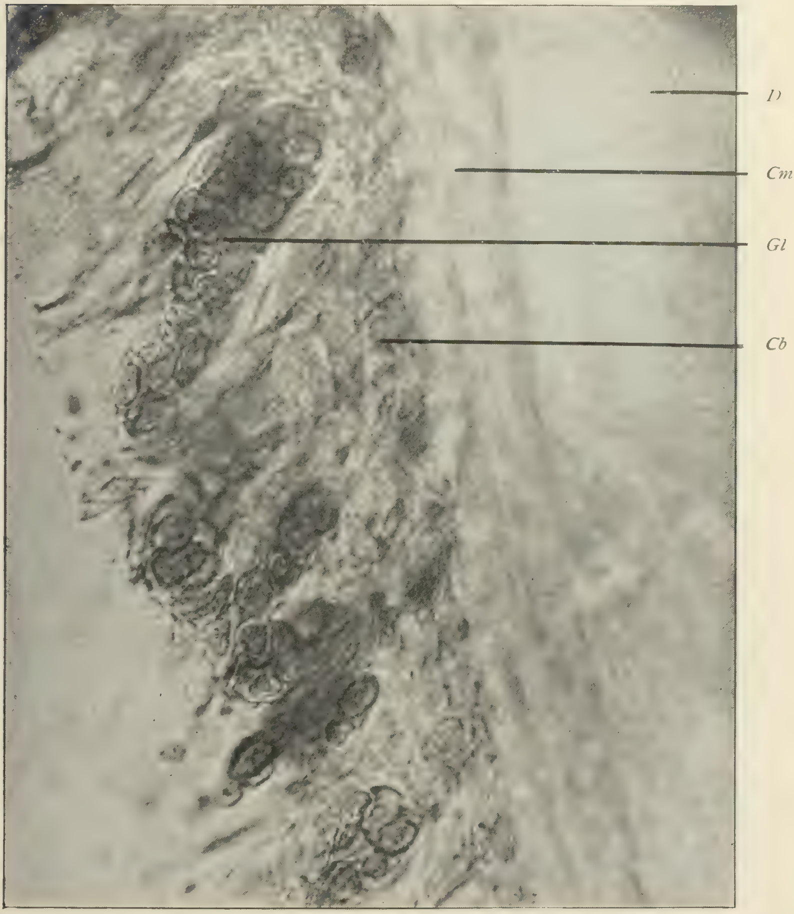


Glands of the peridental membrane. *Cm*, cementum; *Cb*, cementoblasts lying between the fibers of the peridental membrane close against the cementum; *Gl*, glands showing cells and their nuclei; *CC*, *CC*, connective-tissue cells; 12th-inch lens.

These illustrations are perhaps sufficient to show the histological characters of these glandular bodies.

Lumina do not generally appear in the observation of these bodies, and yet a distinct lumen has appeared so frequently as to leave no doubt of their tubular character. In some respects they resemble the sweat-glands. But there is no glomerule, and they also differ from the sweat-glands in being branched and connected in every direction, though their most general course is parallel with the length of the root of the tooth.

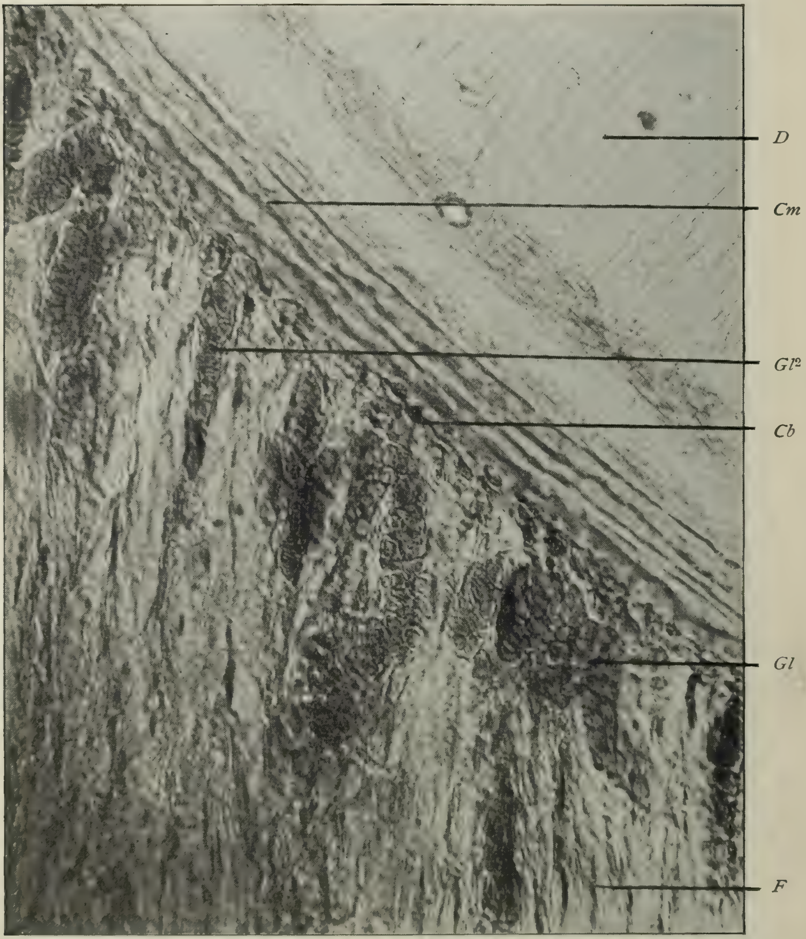
FIG. 13.



Glands showing shapes assumed from crowding between the fibers. *D*, dentin; *Cm*, cementum; *Cb*, cementoblasts; *Gl*, gland-cells crowded between the fibers of the peridental membrane. The nuclei of these cells also appear.

When I first discovered these glands I very naturally expected to find ducts leading to the gingivæ, since my clinical observations had previously led me to believe that a secretion was poured into the gingival space. But in my first attempts to discover ducts leading from these glands to the gingivæ I failed to find them. In all my sections the glands ceased suddenly without making any connection with the gingival epithelium. This effort was made mostly in serial cross-sections, after a few teeth cut lengthwise had shown that such ducts could not exist in large numbers. In these, certainly, occasional cell groups appeared, indicating the possible presence of ducts. I was unable, however, to so connect them as to make them out as ducts, and the conclusion at that time was that such ducts were not present, and that no secretion could come to the gingival space from these glands. This seemed to force the opinion which I then expressed ("Periosteum and Peridental Mem-

FIG. 14.



Showing extreme crowding of glands between the large white fibers of peridental membrane. *D*, dentin; *Cm*, cementum; *Cb*, cementoblasts; *Gl*, loop of glands; *Gl*², extreme crowding of gland-cells between the fibers; *F*, large white fibers particularly well shown.

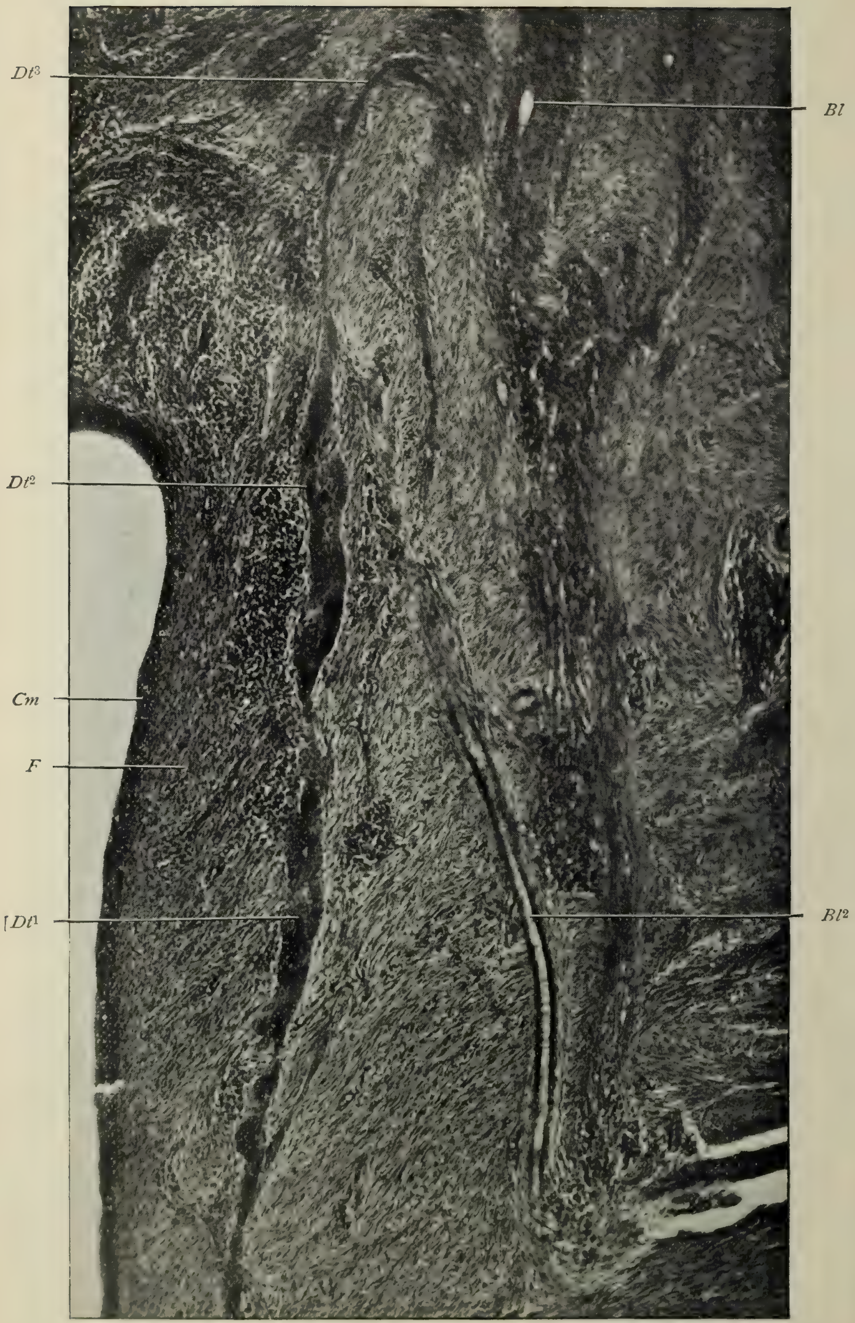
brane," page 90), that these glands were lymphatic, an opinion with which I was never fully satisfied, because of the character of the cellular elements of these bodies. Therefore, since my studies in 1886-87 this has frequently occupied my attention, and latterly Professor Noyes has in his class work produced numerous sections for study. While these have usually been cross-sections, because they display the tissue of the membrane best as a whole, some lengthwise sections have been cut. In some of these we have the appearance of ducts passing from the thick clusters of these glands well toward the epithelium of the gingivæ. Generally these are so tortuous that no connecting tracing can be made out, but occasionally they are more direct in their course.

Fig. 15 shows as much of the length of one of these *(Dt^1, Dt^2, Dt^3)* as could be brought into the field of an aa Zeiss lens. It stretches away toward the gingivus from a thick cluster of the glands, and turns out of the section in close proximity to the gland of Serres at Dt^3, just after passing the level of the attachment of the free margin of the gum to the tooth at the gingival line. In the illustration this duct appears very long, and varies much in size in different parts. A part of this is actual, but most of it is caused by its curving partly out of the section, so that only a part of it appears. In this section, which is cut lengthwise the tooth, the thin cementum *(Cm)* near the neck of the tooth has parted from the dentin (which often happens in decalcified specimens), and is sharply bent at the enamel-border, which it overlaps. In the picture this thin cementum appears as a solid dark band, from which the fibers *(F)* of the membrane spring. Several blood-vessels also appear *(Bl)*, following a course nearly parallel with the duct, in one of which *(Bl^2)* the lumen is central, open, and appears white in the picture.

In tracing these ducts they are found generally tortuous, or, if straight for a space, to become tortuous in the softer structure of the gingival border of the gum in or about the gland of Serres, or in that position in the absence of this gland-like body.

In Figs. 16 and 17 Professor Noyes presents illustrations of the so-called gland of Serres *(Sg)*, or gingival gland. This is a small lobulated mass of connective-tissue cells lying close to the attachment of the gum to the tooth at the gingival line. It is mostly included within the prolongations of the epithelium of the gingival space, or that which covers the portion of the free margin of the gum lying next to the neck of the tooth. The view in the illustrations presented, and with low powers of the microscope, gives it a strong glandular appearance. Its cellular elements are not epithelial, but are round connective-tissue cells. These are in lobules divided in part by delicate hyaline membranes which often appear double in sections, occasionally giving the appearance of ducts. But close studies of them indicate rather that they are duplicatures of the membranous envelope. In part the lobules are divided by epithelial bands from the prolongations of the epithelium of the gingivæ. This is seen best in Fig. 17. Also a strong epithelial band from the gingival epithelium *(Epl* and *Epl)* encircles

FIG. 15.



Apparent duct of glands of peridental membrane starting from group of glands not shown in the field and stretching away toward the gingivus. *Cm*, cementum parted from the dentin; Dt^1, Dt^2, Dt^3, duct entering lower part of picture and curving out of the section at Dt^3; *Bl*, *Bl*, blood-vessels.

the whole mass and parts it from the neighboring tissues, except at its base. In cross-sections this epithelial band is seen to be a continuous sheet without break. Though definitely lobulated, this body does not seem to possess the characters of a gland, and I should not suppose from an examination of its tissue that it had a glandular function. It encircles but a portion of the neck of the tooth, usually only the approximal portion, thinning away toward the buccal and lingual, so that in many of the lengthwise sections it may be very small or does not appear at all.

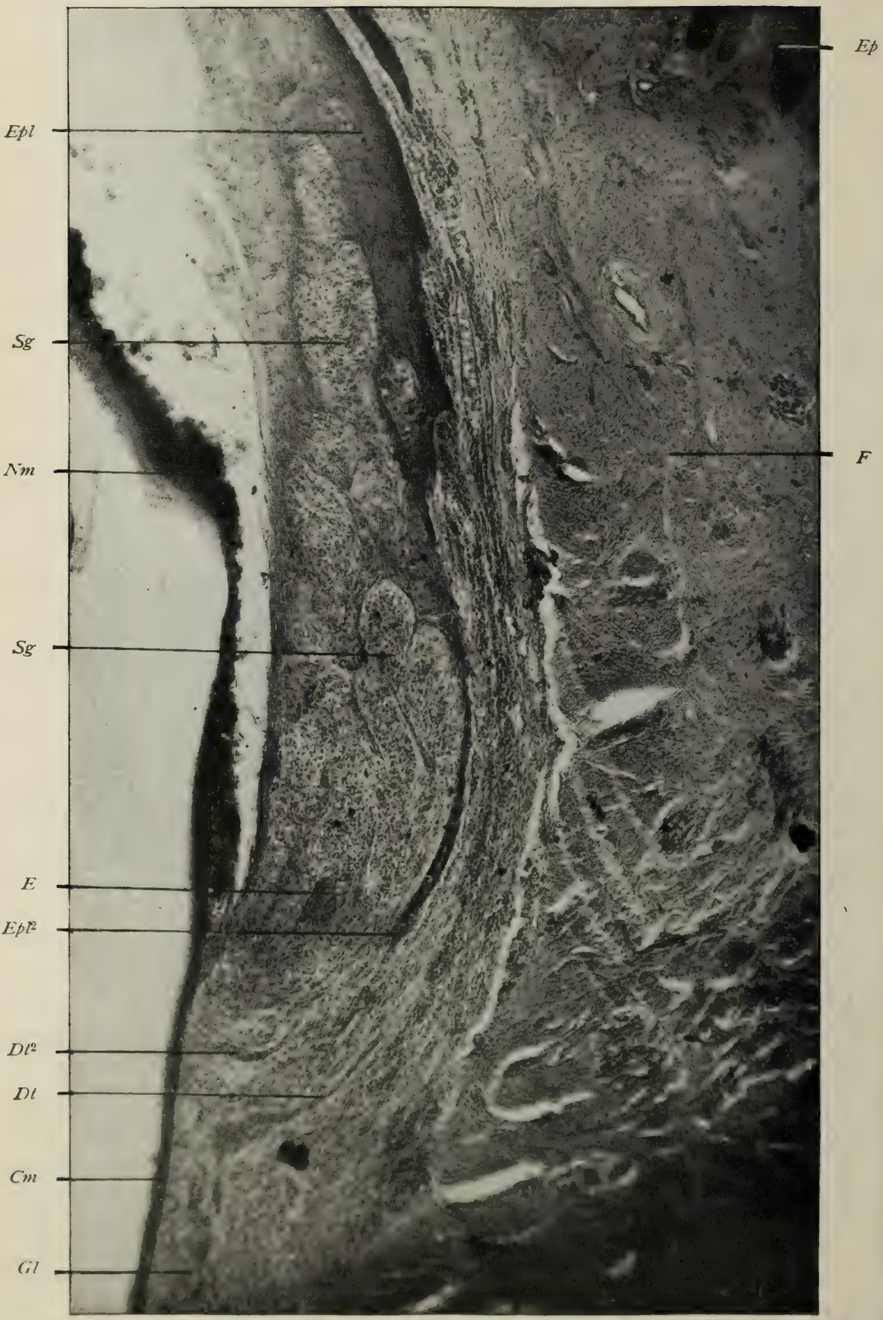
In Fig. 16, at *Gl*, lying partly in shadow, is the appearance of tortuous ducts from the pericemental glands, or a plexus of these glands lying unusually far toward the gingivus. At *Dt* is the appearance of a duct stretching away from this toward the outer portion of the gland of Serres. At Dt^2 another of these ducts coils in and out of the section. Also at *E* there is a considerable group of epithelial cells, which are most likely from the end of an epithelial leg from the gingival epithelium. In Fig. 17 some of these epithelial legs from the gingivæ continue so far into the connective tissue and become so slender that they seem to assume characters so different from the superficial epithelium that differentiation between these and ducts becomes difficult. In this confusion the ducts of the pericemental glands are lost. No distinct opening into the gingival space has been seen.

But little can now be said of the function of the network of glands of the peridental membrane beyond what is indicated by their form, location, and histological characters. With the knowledge of their position and general character, clinical observation leads to the conclusion that they are readily disturbed by certain drugs, notably by mercury and iodin; and that they are often disturbed by substances poisonous to them floating in the blood-streams. This is evidenced by the appearance of marginal gingivitis, with soreness of the peridental membranes. Such disturbances would not be likely to occur without the presence of some specialized or secretory tissue.

It seems to me very certain that the disease which I have described as phagedenic pericementitis has its seat in these glands. The location of the initial lesion and its progress to the formation of deep pockets indicates that the beginning is in these glands, and that in its progress they are followed into the depths of the alveolus, the fibers and adjacent tissue suffering by reason of their proximity. It also seems to me that this disease is caused by some micro-organism not yet identified, which has a special tendency to this tissue as the bacillus of typhoid fever has a special tendency to Peyer's patches and the agminated glands of the small intestine. But neither of these propositions has yet been made out in a way to satisfy the demands of science. I have only clinical observations as yet on these points, and it is becoming almost a proverb that upon such subjects clinical observation, unsupported by direct scientific physical research, is extremely unreliable.

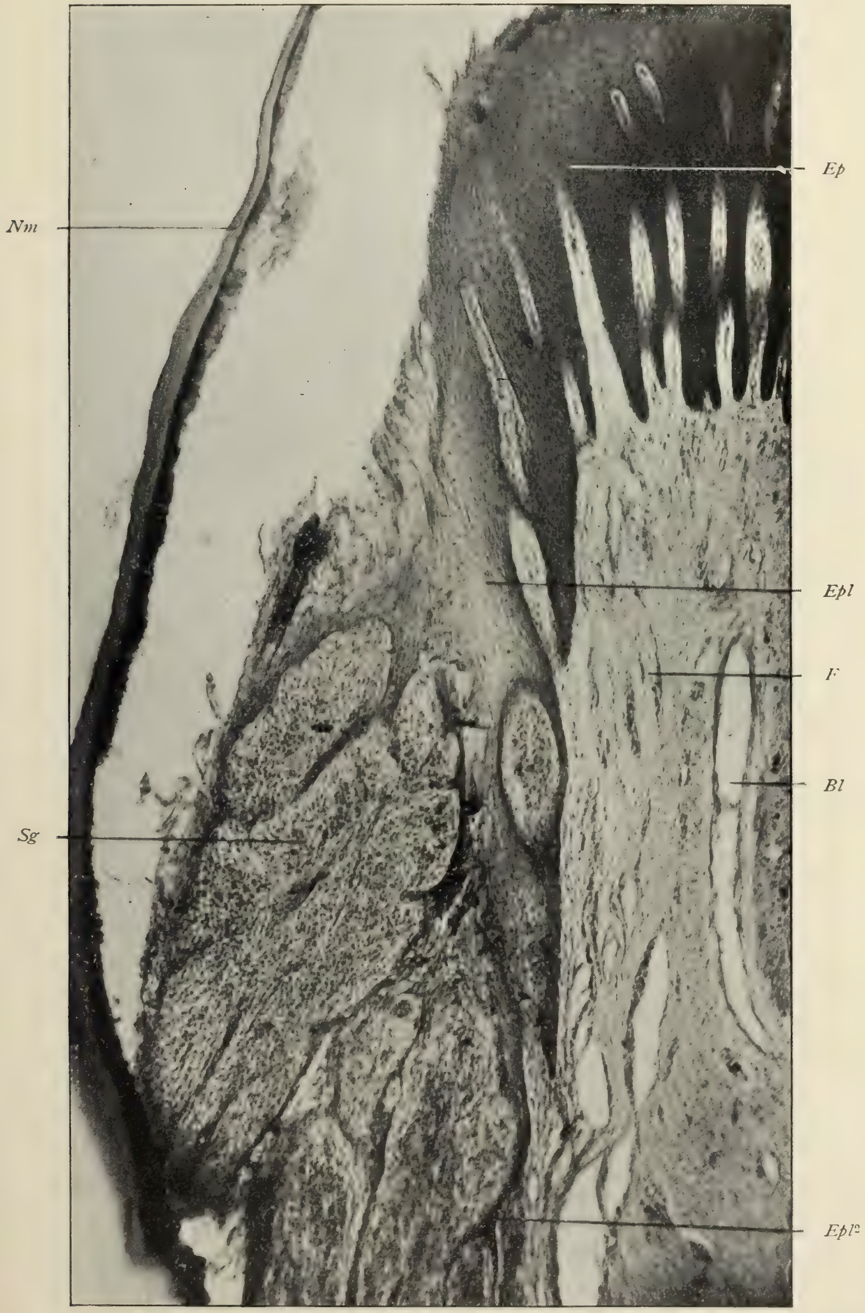
It seems impossible to make the necessary studies of the disease in man, because the conditions do not render the necessary material

Fig. 16.



Gland of Serres, or the gingival gland. *Sg*, *Sg*, gland; *Cm*, thin cementum parted from the dentin; *Nm*, Nasmyth's membrane parted from enamel by the acid used in decalcifying; *Epl*, epithelial leg from superficial epithelium penetrating to *Epl*^{2}, and separating gland from neighboring tissues, except at its base; *E*, epithelial cells, probably from the end of an epithelial leg; *Ep*, epithelium of outer portion of free margin of gum; *Gl*, glands of peridental membrane; *Dt*, duct leading from glands toward the gingivus; *Dt*^{2}, small loop of a second duct.

FIG. 17.



A second illustration of the gland of Serres, or the gingival gland. *Nm*, Nasmyth's membrane parted from the enamel in decalcifying; *Sg*, gland of Serres; *Ep*, epithelium of gingivus; *F*, fibrous tissue of gingivus; *Bl*, blood-vessels; *Epl*, epithelial leg from gingivus passing down to *Epl²*, and dividing gland from the neighboring tissues. Several small cords of epithelium are seen which may or may not be ducts from the glands of the peridental membrane.

available. What may be done in study from the lower animals remains uncertain. But surely the normal histology of the parts must be made out well as the first step in the consideration of the pathological characters of the disease.

A FEW CONSIDERATIONS IN FILLING TEETH.

BY C. N. JOHNSON, L.D.S., D.D.S., CHICAGO, ILL.

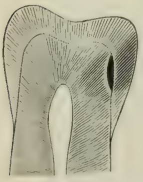
(Continued from page 16.)

The Treatment of Softened Dentin in Deep-Seated Cavities.

In the preparation of cavities the operator often encounters a problem in the presence of a large mass of decalcified or partially decalcified dentin in the bottom of a cavity lying over the pulp. The treatment of this softened dentin is a subject that has long engaged the attention of operators and writers on dental topics, and the concensus of opinion seems in the past to have been favorable to the retention of a considerable portion of the decalcified tissue for the purpose, as stated, of affording protection to the pulp. It has been argued that the pulp will accept more kindly this sort of protection than it will the presence of any foreign material in the nature of filling or pulp-capping. Some writers have even advanced the theory that the softened dentin would take on a hardening process and become recalcified when left in the cavity under these conditions, and protected from further external irritation by a filling.

Without stopping to go into the histological process of tooth-building and the pathological process of tooth-disintegration, it is safe to assume that tooth-tissue is not amenable to any such a law as would account for the recalcification of dentin once decalcified, and the sooner this idea is dismissed from the minds of our operators the better it will be for their patients. From the closest clinical observation of thoughtful men, and from recent investigations into the penetrating effects of caries of the teeth, it would seem to be a serious menace to leave any considerable quantity of decalcified dentin under a filling. Miller has shown that the tubuli of dentin are packed with micro-organisms far in advance of the actual breaking down of the tissue, and, more recently, Dr. J. Leon Williams has presented to us a revelation in the far-reaching effects of caries. On page 289 of the DENTAL COSMOS for April, 1897, he presents a photograph of which Fig. 49 is a fair representation, showing how a tooth may be affected by the acid of caries to a depth beyond the enamel, and reaching very nearly to the pulp without any serious surface indication. The tooth was one in which "there was not a trace of a cavity to be seen on the external surface." Presumably an exploring instrument might have been passed over the enamel without detecting any imperfection, and

FIG. 49.



yet the acid formed by the mass of micro-organisms lodged upon the surface had so affected the tooth-tissue as to dissolve out the cement-substance between the rods of enamel, leaving minute canals down which the acid traveled to form a perceptible cavity at the junction of the enamel and dentin, and also to extend its softening influence some distance into the dentin in the direction of the pulp.

Here is an object lesson to set even the most careless operator to thinking. If the acid of decay may affect tissue to the depth indicated without any perceptible external evidence, what must be the condition of the dentin covering the pulp when the process of decay has gone on so far as to cause a complete disintegration of the enamel and an extensive cavity into the dentin? We can no longer trifle with a disease which projects its baneful influence so far in advance of any ocular manifestation.

Let us study briefly the nature of this decalcified tissue which we are taught to leave under our fillings. It has in large part been disorganized; it is packed with micro-organisms and infiltrated with poisons. If we seal it under a filling we have confined within the tooth just so much of a menace to the life and comfort of the pulp. It will not do to say that the micro-organisms thus inclosed are rendered harmless on account of cutting off their outside sustenance and allowing them to die. A mass of dead micro-organisms is by no means inert. In fact, scientists are telling us that from the dead bodies of micro-organisms come the most virulent poisons. Neither will it do to assume that by the application of an antiseptic to the cavity we overcome the difficulty. We may destroy more or less perfectly the micro-organisms in the dentin, but we are not at all certain of thereby destroying the poisons. In experimental work micro-organisms are killed with chemical agents, and then from the mass thus destroyed the poisons are extracted. It would seem to be a fruitful field of research for some scientist to determine the kind of agent required to destroy the micro-organism and at the same time neutralize its poison.

But what concerns us most in the consideration of the present subject is that by following the generally accepted teaching of the day in the management of decalcified dentin we are simply confining in intimate proximity to the pulp a mass of material which is peculiarly calculated to poison the pulp to death. And this is precisely what occurs in many of those vague cases where the pulp has "unaccountably" died under a filling without an exposure. The greatest surprise is that more pulps have not died from this treatment, and it is accounted for only on the ground that pulps are sometimes exceedingly tenacious of life, and protect themselves against the inroads of the poisonous process by throwing out a deposit of secondary dentin. Even in those cases where the pulp finally triumphs over the evil influence, the operation of filling is quite frequently succeeded by an extended period of sensitiveness which is the direct result of the irritating influence of the infiltrated dentin. In almost every instance where softened dentin is left in the cavity as a source of pulp protection, or to prevent shock from thermal changes, it defeats the very object for which it was left. This mass of tissue is exceedingly irritable. It is more sensitive to impressions of all kinds, whether thermal, chemical, or mechanical, than is normal dentin. It would therefore seem theoretically that the less we left of this infected tissue under a filling the more comfortable would the tooth remain after the operation, and this very fact is amply borne out by clinical observation. In a somewhat close study of this question it has been noted that in those cases where a radical removal of all softened dentin has been effected there is seldom any complaint of subsequent sensitiveness.

This does not imply that we must carelessly expose pulps by wantonly slashing away at every cavity that presents. No operator should expose a pulp if it can be safely avoided. In working around a pulp under these conditions, as has already been intimated, a spoon-shaped excavator should be used to avoid needless exposure. The excavator should be very thin and sharp, so as to peel up the leathery dentin with the utmost delicacy and the expenditure of very little force.

The rules to govern the operator in the management of decalcified dentin may be summarized as follows: Remove thoroughly all decalcified tissue in every instance where its removal will not result in exposure of the pulp. In those cases where it extends to the pulp remove all that can safely be done short of actual exposure, and, if large masses of decomposing tissue surround any portion of the pulp, remove even if it causes exposure. The pulp will be safer under a capping of foreign material than when subjected to the influence of this infected and poisonous mass. Stained dentin is not necessarily infected dentin. If hard and flint-like it may be allowed to remain, even if slightly discolored.

While the exact results of the application of medicaments to decalcified dentin may be as yet somewhat undetermined, it would seem, with our present knowledge on the subject, to be a wise precaution to flood all cavities containing any such tissue with an antiseptic previous to filling. We must also protect the pulp from impingement in those cases where the partition between the cavity and the pulp is so thin as to be compressible under the force of impact by the plugger in condensing a metal filling, or where there seems to be danger from thermal impressions. For this purpose a non-irritating cement is indicated as an intermediate between the filling and the pulpal wall, but this cement must not be built up in such bulk as to render the metal filling too thin for strength.

Hypersensitive Dentin.

This is a subject which has been more or less prominently before the profession ever since teeth began to be filled, and yet it would sometimes seem to be little nearer a solution of the problem than when it was first discussed. This is partly because there are so many varying aspects of the question, and because no sovereign or universal remedy can ever be suggested by which uniform results may be obtained; but possibly, more than all else, because the very thing most essential to success in meeting the trouble is something that cannot well be taught. It relates to a quick perception on the part of the operator as to the real difficulty with each case which presents, and to the most active ingenuity in meeting the particular issue involved. In many instances it would seem to be the dentist who needed treatment instead of the dentin. In others the patient requires operating on in advance of the tooth.

To present this subject in anything approaching a systematic order, it will be necessary to classify somewhat the conditions which may confront the operator. These conditions relate to the varying temperaments of patients, and to the differences in character of sensitive teeth. Patients require the closest study in order to know how best to approach them to dispel the common dread of the dental chair, and no operator is suited to the practice of dentistry who ignores this important feature of his work. It has been too long a crying disgrace to dentistry to permit the impression to prevail among all classes that dental operations are necessarily so very painful. Some of the old-time heroic operators (blessed be their memory) are, in this one particular, blamable that they too often entirely ignored the sensibilities of their patients, and treated them as if they were mere blocks of wood. We of to-day are reaping the results of some of this early sowing in the almost universal dread with which patients approach the dental chair, owing largely to the traditional story of its tortures. In the modern dental practice, properly conducted, there is little to justify this dread, and the dentists of to-day should do all in their power to overcome the impressions formed by past years of mismanagement.

In studying the characteristics of our patients in this regard it might be possible to make many minute classifications as to conduct and temperament, but for present purposes a more general consideration must suffice.

First as a class may be noted those of a highly-wrought, nervous temperament, who are by nature sensitive to impressions of all kinds, whether physical or mental. This, when augmented by environment or occupation, creates a condition which calls for the keenest perception on the part of the dentist, both as to management of the patient and manipulation of the teeth. They are usually professional men or women,—artists, musicians, sculptors, or literary people,—and, fortunately for us, they are generally individuals of a high order of intelligence. They are quick in their perceptions and are appreciative of skillful service. No dentist of mediocre attainments need hope for an extended practice among this class, and yet, if managed by a master hand, they prove a most desirable clientele. The essentials in meeting these patients relate to a thorough mastery of the minutest details of the work in hand, and a quiet but rapid execution of all manipulative procedures. There must be no false movements, and no lapses of the closest application. To accomplish the greatest good all work must be done on the high-pressure principle. A patient like this will bear to be hurt for one short moment provided something definite be accomplished in that moment, but will not tolerate unskillful puttering. Every line of procedure must be carefully studied by the operator in advance, so that he knows precisely what he is going to do before he attempts to do it. Any awkward fumbling in the manipulation is instantly recognized by the patient, and confidence is to that extent destroyed. The utmost delicacy of touch should be cultivated, and this complemented by firmness of force wherever force is indicated. Short sittings must be assigned, and the greatest possible measure of accomplishment attained during the time the chair is occupied. In brief, this type of individual demands of a dentist the exercise of his keenest wits, and to operate to the best advantage he must operate on a tension keyed to the highest pitch. It is therefore well that all our patrons are not of this variety, and yet, as has been intimated, they prove a savoring lump to the rank and file and are in many ways a desirable class. They stimulate an operator to his best achievements, and reward him with an intelligent appreciation of all that he accomplishes for them.

Another class of patients consist of large, robust, healthy individuals who are by nature cowardly when it comes to the infliction of physical discomfort. They may be brave enough about other affairs of life, but it would sometimes seem that the larger they are in physical proportions the smaller they are in courage to take the dental chair. There is no moral suasion that can be used on these people to make good patients of them. The only line of procedure is to avoid as far as possible giving pain by the use of cataphoresis, or by employing plastic fillings and temporizing to keep the teeth comfortable, with the hope that eventually we may in some degree overcome their dread sufficiently to accomplish more permanent results. If we undertake anything like thorough work at the outset, we simply drive them away from the dental office to allow the teeth to decay past all recovery. Then when toothache assails them they seek out some dentist who gives gas, and that is the end of that chapter.

Another class relates to those effeminate, irresponsible individuals who have no stamina of any kind, physical or mental, and who require a strong guiding hand to control them in any emergency of life. They are usually forced to go to the dentist either by pain or by the admonition of friends, and their successful management calls for a rare combination of gentleness and firmness. They must of course be assured that the dentist will not hurt them more than is absolutely necessary, but they should also be given to understand that they must nerve themselves against any pain that is necessary. A dentist should never be harsh with any patient, but with this particular class it is sometimes salutary to be stern and to permit of no trifling. If much sternness is demanded during an operation, it should invariably be tempered before the patient vacates the chair with the kindest possible tone of voice, to the end that the patient leaves the office with the conviction that the dentist is kind of heart and is severe only for the patient's good. A series of dental operations for an individual of this type often proves of the utmost disciplinary benefit, provided the operator is an acute reader of character and knows just when to be firm and when to be gentle.

He should be quick to detect the difference between simulated pain and real pain, from the fact that these patients are much given to protesting even when there is no occasion for it. A simple pressure of an excavator on the enamel of a sound tooth is as likely to cause them to flinch as if a mass of sensitive dentin were being removed, and no self-respecting operator will long allow himself to be made the victim of this kind of folly. He should have the issue out with them immediately on the detection of such imposition, and give them to understand that he is neither to be deceived nor trifled with. But the moment it becomes necessary to give real pain he should be the very essence of gentleness and forbearance, and do all in his power to help the patient over the painful points. In this way he will not only prevent imposition in the future, but will establish confidence in the mind of the patient that he is solicitous only for his welfare. Absolute honesty of conviction and conduct, together with tact in its fulfillment, is the keynote of success with these, as in fact with all other patients.

The management of children in the dental office is another consideration worthy of the closest study. A child never should be given pain if possible on the occasion of its first visit to the dentist. In fact, the infliction of pain should be as largely avoided as may be till a feeling of harmony and confidence has been established between the little patient and the operator. A child should be received in the operating-room with a cheery smile, as if the affairs of the world were very bright on that particular occasion, and that a visit to the dental office was not such a terribly serious thing after all. Unfortunately, children usually come to the dentist with more or less apprehension, owing to the traditional table talk about the horrors of the dental chair. It is the prime function of the dentist to dispel this idea, and he who has kindness, tact, and good judgment can work wonders in this direction on that momentous first visit. But he must have a love of children inherent in his heart or he cannot hope to succeed. He who does not love children would better direct them to some one who does, because of a certainty they will prove a constant source of annoyance to him, and he will accomplish little else with them than to increase their dread and distaste of dental operations.

A child should never be deceived by a dentist under any pretext whatever, and yet it is not well to make prominent the fact that it is going to be necessary to inflict pain. The dentist should lead gradually up to any painful operation by a series of dextrous and careful manipulations about the teeth, and a running talk with the patient upon the contingencies of the case from a child's point of view. The thing of first importance is to establish confident and cordial relations with the patient, and when this is once attained the operator can accomplish really wonderful results, even upon the youngest child. Tact, kindness, the alleviation of pain when the patient is suffering, lack of deception, and short sittings, all harmonize into the successful management of children's teeth.

If the control of the different classes of patients herein briefly outlined is studied, the problem of the sensitive dentin is many degrees more than half solved; in fact, it would sometimes seem as if this bugbear were greatly exaggerated by the profession. A careful observation of the causes which lead the average patient of to-day to dread the dental chair in a properly conducted practice will reveal the fact that it is as much the concomitant annoyances of the rubber-dam, the separator, the mallet, the use of disks or finishing strips, the grating of excavators, or the vibration of rotary instruments, as it is the infliction of any real pain in the cutting of sensitive dentin. And yet there are many unmistakable cases of actual hypersensitiveness that must be recognized and dealt with.

The treatment of these cases relates to proper instrumentation and proper medication,—the former fully as important as the latter. The dextrous use of instruments will reduce the number of cases requiring medication to a very narrow limit, and it is strongly urged that a most careful study be made of the manner of approaching hypersensitive dentin so as to remove it with the least possible discomfort.

Cavities may be divided more or less perfectly into classes, each class presenting its own peculiarities of sensitiveness, and suggesting the method of treatment best suited for it. A large class consists of those cases where there is a mass of softened dentin nearly filling the cavity, with much overhanging enamel. If an instrument is thrust into this leathery mass at almost any point it is sensitive. If there is any manipulation of it along the surface it gives pain. The first thing to do is to break down all overhanging enamel, so that the dentin lies as fully exposed as may be before any attempt is made to remove it. Then, with a thin-bladed excavator, whetted keenly sharp, the whole mass should be removed as completely as possible with one sweep. This can ordinarily be done with little pain if the blade of the excavator be sunk at one side of the leathery mass to its depth, and the mass rolled out. The tissue immediately under this softened layer is usually not so sensitive as the surface, and the remaining cutting to give form to the cavity is seldom appreciably painful. But, in case there is sensitiveness, it can be controlled by dehydrating the tissue with alcohol, followed by warm air. If the rapid dehydration causes pain it should be preceded by ninety-five per cent. carbolic acid, after which the cavity can be dried with little discomfort.

In the application of any medicament to a cavity the fact should be made prominent to the patient that the drug is being used for the purpose of relieving the pain. This of itself reassures the patient, and is often of more benefit in a psychological way than is the specific action of the drug.

Another class of cavity calling for treatment peculiar to the case in hand consists of those shallow oval cavities, particularly on the labial or buccal surfaces, where there is little softened dentin, but merely a corroded and reasonably hard surface to the cavity. Most of the cutting must be done in comparatively firm tissue, for the purpose of giving retentive form to the cavity and to secure perfect margins. These cavities are much dreaded by dentists on account of their traditional sensitiveness, but by a careful observation it will be found that with very many of them the sensitiveness exists only on the surface. The first touch is the worst. If, when the rubber-dam is applied and the cavity dried, the operator will take a sharp inverted cone bur, as already advised for forming these cavities, and, with the engine revolving rapidly, place the end of the bur in the deepest portion of the cavity, and just at that moment speak to the patient in a reassuring tone of voice, and while speaking at once penetrate this outer sensitive crust with the bur, the worst of that cavity preparation is over. The bur may then be carried laterally, its end to the full depth of the cavity and cutting with its sides, causing little pain. The cutting in the deep portion of the cavity is less painful than would be the slightest manipulation on the surface. The surface should therefore be left alone as largely as possible till the sides of the bur have undermined it in advance. In the successful management of these cases there must be no hesitation and no half measures. The operator must know definitely what he is going to do, and then do it with the greatest dispatch and precision. It requires a masterly, vigorous hand, wielded with the utmost delicacy.

Sometimes the surface sensitiveness of these cavities may be greatly reduced by medication and desiccation. For this purpose carbolic acid, followed by alcohol evaporated with warm air, seems to give the best results with the least accompanying discomfort. The application of drugs which cause more pain on contact with the dentin than would the preparation of the cavity itself should be discontinued, unless for those exceptional individuals who seem to prefer any kind of pain rather than pain given by an instrument.

With very many cavities it will be found that the sensitiveness is confined to one or two small areas, which if dextrously undermined or cut through quickly will solve the problem in short order. When an operator discovers in a cavity one of these sensitive points he should avoid manipulating it, unless with a definite attempt at its complete removal.

The last class of cavities for consideration relates to those occasional cases where the teeth are in an unmistakably hypersensitive condition, where the slightest pressure upon a cavity results in pain, and where anything like thorough manipulation is out of the question. There is one of two courses to pursue: either to numb the sensibilities of the tooth by cataphoresis, with all of its concomitant paraphernalia, its consumption of time, its accidents, and its as yet undetermined ultimate results, or to employ as a temporary expedient till the sensitiveness subsides some filling-material such as cement, which may be used without the thorough preparation of the cavity required for the metals.

Sometimes one course is indicated and sometimes the other, but in the large percentage of cases it will be found better to make use of temporary fillings to tide the teeth over the sensitiveness, rather than to follow the general employment of cataphoresis. This latter process, unless simplified far beyond its present complications, is indicated only in exceptional and desperate cases, where hope for relief in no other way is possible.

In the use of cement for the sealing of cavities temporarily, as just advised, the common error is made of allowing it to remain too long, till it is so disintegrated as to defeat the object for which it was used. If a cement filling be placed in a very sensitive cavity so as to perfectly seal it from external irritants, and allowed to remain from three to four months, it will be found on removal that the cavity can be prepared properly with little pain. As much of the decay as possible should be removed from the cavity before the cement is inserted, and when the cement is to be drilled out the rubber-dam should be applied and the cavity kept free from moisture till prepared as desired. In those cases where it seems impossible to remove the decay in the first instance it is often advantageous to seal a pledget of cotton saturated with the oil of cloves in the cavity for three or four days, when the decay can ordinarily be rolled out of the cavity with sharp excavators.

The whole question of the management of sensitive dentin, except in the rare instances just indicated, resolves itself to the following summary: Manipulative skill on the part of the operator, tact in knowing how to control the different temperaments among our patients, and the invariable use of the keenest, sharpest instruments.

(To be continued.)

THE IMPROVED ELECTRIC OVEN AND THE MEANS OF DETERMINING THE HEAT IN FUSING PORCELAIN.

BY L. E. CUSTER, D.D.S., DAYTON, OHIO.

(Read before the National Dental Association, August 30, 1898.)

LIKE many other inventions, the electric oven has gone through a change which has resulted in a practically perfect instrument. It is a satisfaction to the writer to know that the first oven, crude as it was, was received so generously by the profession. The difficulties that were met and which have been overcome, one by one, and the amount of time and expense entailed are almost inconceivable. The difference between the melting-point of high-fusing porcelains and the platinum wire which produces the heat is very small, and yet it is within this narrow margin that the electric oven operates. It was said by one who presumed to know, that a platinum wire could not be heated hot enough to fuse porcelain over twelve times without undergoing such a change as to ruin it. There is no question but that a slight change does take place in the molecular arrangement of platinum when repeatedly heated almost to the point of melting.

The amount of abuse to which the oven was first subjected, because it seemed a toy as compared with gas and coke ovens, has not been without some good results. The dentist invited in his neighbors to show how hot he could make it; he tried to make calcium carbide in it, and even tried to melt his scrap platinum in it. Who ever heard of the successful melting of one piece of iron by holding another piece of hot iron close to it? These are only a few of the abuses that have come to the surface.

The perfection in detail of the electric oven has all been in the direction of producing the highest heat in the oven cavity, with the lowest possible heat of the platinum wire. In other words, step by step I have reduced the necessary heat of the platinum wire. It is evident that since porcelain is fused by heat radiated from the wire, the wire must always be a little hotter than the porcelain, but by perfecting every available point which will be of advantage I have succeeded in lowering the necessary heat of the wire to a point which the platinum wire will withstand for hundreds, and perhaps thousands, of heatings. Professor Haskell has used such an oven for two years without a single burn-out, and Dr. Thomas reports having used nearly one hundred ounces of Close material without a burn-out, a conservative estimate of which would be that each oven was heated from 800 to 1200 times.

The first improvement consisted in conforming the oven cavity more closely to the shape of a set of teeth and in making every inch of the cavity-walls heat-producing surfaces, except the two small openings. Every wire that can be introduced to radiate heat decreases the required temperature of the others, and the closer the wires can be arranged without touching laterally, the better. Hence, by making every inch of the inner surface a heat-producing surface with no open ends, the highest efficiency is secured as well as an even fuse to the porcelain case.

The second improvement consisted in bringing the wires to the surface of the clay. When the oven was first made, the wires were covered with a thin layer of clay for the purpose of keeping them in place and protecting them from metals and from injurious material used for investments. The majority of dentists did not know that the pumice stone investments would melt in a heat necessary for melting high-fusing porcelains. I soon ceased burying the wires in the clay, and by short curves was able to place them on the surface just deep enough to be caught. By this arrangement nothing intervenes between the wire and the object heated, so that the wire is not heated as hot as previously. Precisely in proportion to the distance of the wire from the porcelain and to the thickness of an intervening wall, if any, the temperature of the wire has to be raised above that of the porcelain treated.

Theoretically, if the wire could be suspended in the oven cavity without touching the walls at all, the best conditions would be attained, and while the wires do not ordinarily break from their investment, owing to the manner of arranging them in short curves, if they should, so long as they do not buckle to the extent of touching a neighboring wire the conditions are improving and the oven becomes more efficient.

The third improvement was in the manner of arranging the wires. The first oven made contained the wires arranged the same distance from one another all over the heating surface. I soon saw that the center of the oven became the hottest, and that the heat of the side walls was far below the heat in the center. A plate fused in such an oven would be overheated in the palate or not fully fused around the rim. These ovens burned out in the center because of the overheating of the wires at that point. It may seem strange that an oven not spherical in shape would become hotter in the center, even if the wires were placed the same distance apart all over the surface. But it is true, and this condition was met by beginning at the center and arranging the wires closer together as the distance from the center increased. By this arrangement the whole inner surface of the oven cavity has the same heat. This was an important step, and I am gratified to see it being copied in late electric culinary utensils.

The fourth improvement was one which was arrived at only after the study of the working of over a hundred ovens. It was not generally known, if known at all, that the negative end of a wire heated by a constant electric current becomes about one-fifth hotter than the positive end, and I am yet without positive information why, and no one of whom I have inquired has been able to give a satisfactory explanation. This does not become apparent in a wire heated in the air, but in the electric oven it is present, and accounts for the trouble that has arisen at the negative end. I found that it was always the negative end that gave the trouble, that it was due to the overheating of the wire at that terminal, and that when I wound an oven with the negative end of the wire larger than the positive end I overcame the last and most perplexing problem of the oven, which may now be said to be perfect in every detail under intelligent use.

I wish to bring to your notice two appliances for determining the heat of the oven. One is by the use of a thermometer, and the other by the use of a small arc light. The thermometer is a modification of one first used by Dr. J. R. Callahan, of Cincinnati, and the arc light is my own.

Dr. Callahan used a high-reading thermometer by placing the bulb of it in a clay stopper, molded to fit the upper opening. This quite accurately measures the heat of the oven. For my own use I secured a high-reading thermometer, called a "pastry" thermometer. This is about six inches long and reads to 600° F. Instead of placing the bulb of this in the clay stopper, I use a 20-gauge platinum wire, allowing one end to enter the oven cavity three-eighths of an inch and the other end to terminate outside in a cup large enough to inclose the bulb of the thermometer. This wire runs straight through the stopper which holds it in place, and is shown in Fig. 1. By using the wire, the heat is conducted from the oven cavity more accurately than by the clay stopper, and the heat of the cup, while not as hot as the one in the oven, is always exactly proportionate to the heat in the oven, and a scale having once been made can always be depended upon thereafter. If it is desired to be accurate to a hair's breadth in the fuse, it can be done by using a pellet of gold, which can be seen to melt, as the basis of calculation. When the gold melts it is only necessary to turn off the current when the mercury reaches six points above the melting of the gold for Close body, or four and one-half points for Close gum.

By the use of the thermometer as above described it is possible to fuse porcelain to any predetermined degree with perfect accuracy, and it is so easily done that the operator will find pleasure in doing it, as he can with perfect assurance relegate this important operation to his assistant. Compare this for one moment when the uncertainty and guesswork of coke and gas furnaces, and you can in a measure realize what has been accomplished.

If the operator does not care to employ a mechanical method like the thermometer for determining the heat, and desires one over which he can have complete control, the arc light, which I will now describe, will be a revelation to the old-time porcelain worker. When the oven was first invented I found it difficult to tell the exact degree to which the porcelain had fused, and this I, in a measure, overcame by placing a small opening in the top which would admit a ray of light of different color from that of the oven, and in that way make the surface visible. It is not always possible to use a ray of sunlight for this purpose, and I now substitute the next thing to it, an arc light. By means of a little framework placed on the top of the oven a small carbon is held opposite the upper opening, and another carbon is held in a guide. This is shown in Fig. 2. The second carbon is movable. When the operator desires to see the porcelain melting, the movable carbon is pushed toward the fixed carbon till the two are in contact. The movable carbon is then withdrawn a short distance, and a brilliant arc will be struck which throws such a strong light in

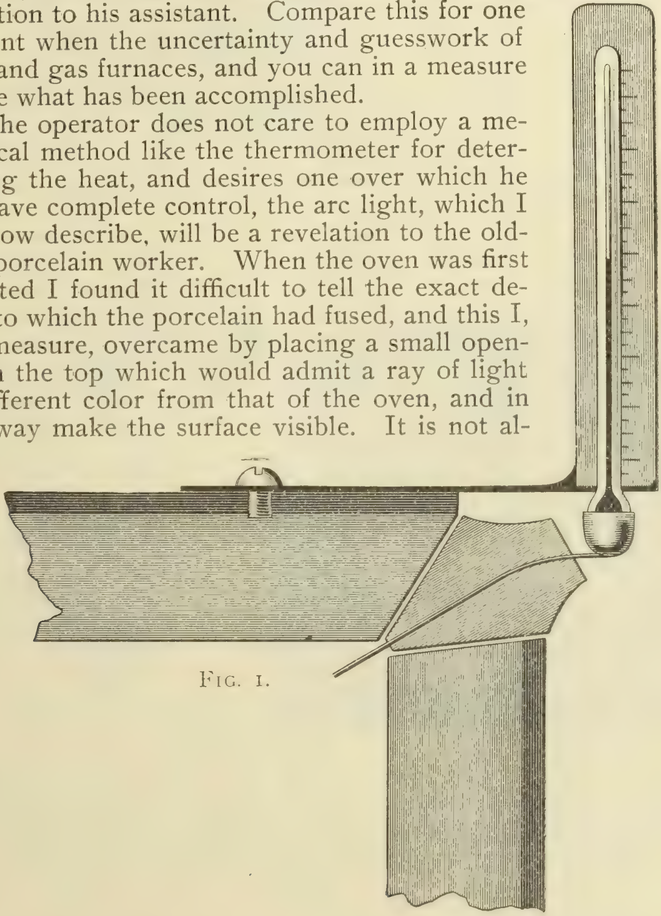
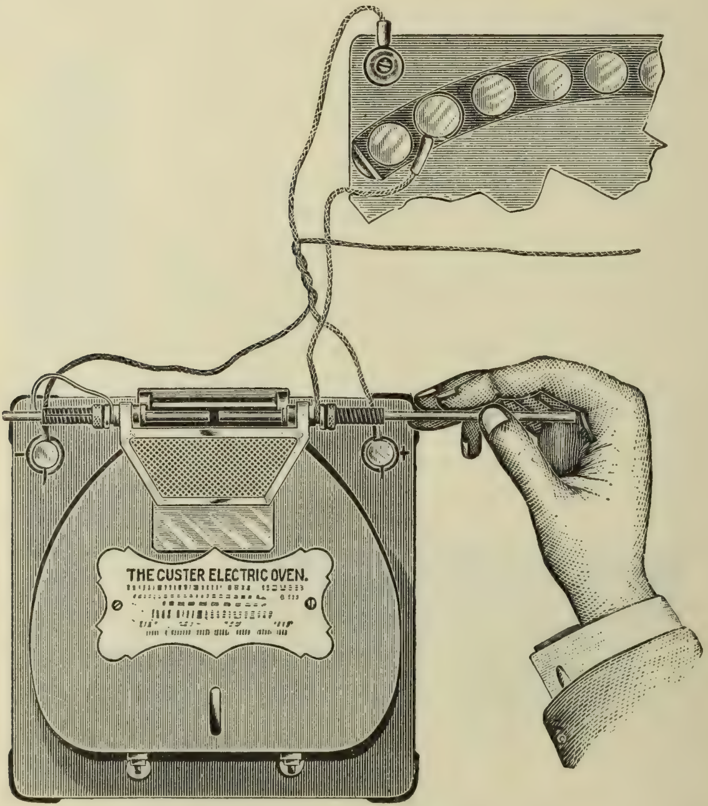


FIG. 1.

the oven that the operator viewing the case from the front opening sees the porcelain melt as distinctly as if it were in the open air. He has absolute control over the case, and he knows to a certainty to just what degree the porcelain is fused. With this there is no guess-work, and the eye is relieved of the great strain of trying to make out an indistinct object. I cannot too strongly call to your attention this little device, almost as marvelous as the oven itself, which supplies a want as old as porcelain work in dentistry.

FIG. 2.



REMOVAL OF THE DENTAL PULP.

BY B. HOLLY SMITH, M.D., D.D.S., BALTIMORE, MD.

(Read before the National Dental Association, August 31, 1898.)

THOSE familiar with the history of the healing art will consent to the proposition that in the proportion that medicine has grown scientific and skillful has less dependence been placed in the therapeutic effects of drugs for the alleviation of human ills. Thirty years ago it was no uncommon thing for a patient to be salivated with mercury and deafened by quinin administered for the relief of a slight attack of malarial fever. The salivation and loss of hearing incident to the treatment cut little figure with the physician. Like his prototype who made a specialty of fits and assaulted his patient with hammer and tongs with an eye single to the relief of the condition, his vigorous onslaught upon the disease absorbed his whole effort, and the fact that the subject might emerge from this Midshipman Easy triangular duel between the mercury, quinin, and malaria toothless and deaf was regarded as one of the idiosyncrasies of the human physique for which the doctor was in no way responsible.

That these exhibitions are less frequent to-day is due not to the fact that these drugs have lost their anti-malarial efficacy, but to the data furnished by the scientific investigators of the pathological action of drugs. Secondary effect has assumed greater importance, and possible evils attending administrations have outweighed the advantage of immediate relief.

The practitioners of the specialty of dentistry for more than half a century (since the introduction of arsenic into the profession by Spooner in 1836) have resorted to the application of arsenious acid to the dental pulp with a view to its destruction. For years the teaching was that the arsenic should not remain in the tooth-cavity longer than twenty-four hours; but of late it is not uncommon to leave it sealed in for two weeks, and many do not disturb it until disintegration of the pulp has taken place.

We are told that it is not necessary to expose the pulp to make the application effective, that the arsenic will penetrate the dentinal tubuli, and the pulp-destruction will be accomplished painlessly. Indeed, so penetrating are we led to believe this agent to be that a recent writer has claimed that teeth to be crowned should have their pulps destroyed and removed, as the slight amount of arsenic contained in the cements with which the crown is set probably will cause pulp-destruction.

Has any one found the exact limits of the destructive power of this agent? Is it a fact that this treatment, which has persisted so many years with little modification, has been attended with no secondary evils?

It becomes a very difficult matter from a clinical standpoint to answer these questions without fear of contradiction. That pericemental disturbances do frequently occur can be stated without dispute. That arsenic may be the cause of it has long been the thought of the writer. This opinion has been formed through observation of the contrast between pulpless teeth made so by surgical procedure pure and simple, and those from which the pulps have been removed after the application of arsenical preparations, this observation covering a period of sixteen years. During this period I have yet to see a case of pericemental inflammation or abscess where the pulp has been removed without resort to the use of arsenic. The contention has been that where pericemental disturbances occur in teeth in which the pulps have been destroyed by arsenic, it is the result of faulty technique or failure to operate under proper aseptic conditions. We think this assumption untenable, in view of the fact that skilled, clean, and careful operators have not been able to establish any record which does not indicate cases of apical or pericemental trouble, in spite of reasonable precautions.

If, as has been stated, arsenic will destroy the dental pulp by an extension of its action through the dentinal tubuli, it cannot be disputed that its fatal effects upon that organ must also embrace the contents of the dentinal tubuli throughout the tooth. The well-known germicidal qualities of arsenic, together with the fact that it has been used successfully as the chief ingredient of embalming fluids, would indicate that no trouble should be expected from the contents of these tubuli when they have been subjected to the arsenical application and securely sealed from the chance of subsequent infection. Indeed, it would seem that the contents of the pulp-canal and tubuli while directly under the influence of the arsenic would offer a very poor field for infection; and it seldom happens even in careless hands that immediate unfavorable results follow. The contents of these tubuli, shut off from outward infection, separated from the circulation and under the embalming influence of the arsenic, would seem to offer no menace to the health of the tooth, even though the apex were imperfectly sealed; yet trouble not infrequently does arise in after-years, even when the operator has been reasonably certain that the apex was entirely closed.

Why? Is it possible that a sleeping volcano has been located in the apical space by the application of arsenic, that the effect of the agent has not been limited to the confines of the root-canal and dentinal tubuli, that the area of tissue affected breaks down in seasons of depressed vitality, or becomes infected through the medium of the circulation? Why should the arsenic affect only the contents of the root-canal and dentinal tubuli? The apical opening may be infinitesimal, but it must of necessity be large in comparison with the tubuli in the dentin. Why may not the nerves and vessels in the apical space and a considerable area of the pericemental membrane have a share in the action of the arsenic?

There is no positive evidence of a well-defined line of demarkation in the effect; even after the agent passes the point where it has power to destroy, may it not deplete and incapacitate the tissues, until disaster is invited and may subsequently occur?

The most doughty and enthusiastic advocate of arsenious acid, Dr. J. Foster Flagg (in the DENTAL COSMOS for July, 1877), says, "It is the almost universal experience that after an arsenical application has remained in a tooth for several days soreness of the organ supervenes; a tenderness upon occlusion; slight pain from striking, etc., all indications, apparently, of peridental difficulty; but these same symptoms are concomitant with the dying of the last portion of pulp, no matter from what cause, and if a pulp be extirpated during the existence of this condition it will, under the microscope, present an appearance which will clearly indicate the reason for such tenderness, in the evident absence of vitality in the greater portion of tissue, and the equally evident presence of high inflammation in that portion immediately contiguous to the apical foramen." If this state of inflammation occurs in every case with the dying of the pulp, why is it not better that it be extirpated under the influence of an anesthetic?

Arkövy indicates that the agent is quickly taken up into the blood-vessels, no coagulation of tissue whatever occurring. He says, "It has a specific influence upon the blood-corpuscles, combining with the hemoglobin to form a compound of arsen-hemoglobin. In nearly every case it is taken up *in substantia* (in the form of molecules) into the blood-ways; when there it produces, besides the above-mentioned changes, granular detritus of the contents. The nuclei in the neurilemma are somewhat increased; granular destruction of the myelin, and here and there the disappearance of the axis-cylinder occur."

Dr. Burchard, in his recently published "Dental Pathology and Therapeutics," says, "The indication is, that a minute portion of the arsenic is taken into the pulp; this may be either through the odontoblastic processes in cases of non-exposed pulps, or, when exposed, by the cells themselves, and causes violent reaction of the vessel-walls, which dilate to their utmost; extravasation of corpuscles occurs and circulation is checked at the end of the route, the pulp-vessels are mechanically occluded, so that no absorbed arsenic is carried beyond the pulp extremity. The arsenic exercises its paralysant and degenerative influence upon the nerves of the pulp, after first inducing a violent irritation, which may be due to the specific action of the arsenic upon the nerves or to the intense hyperemia. The strangulation theory cannot, however, hold in all cases, for progressive death of structures free to expand occurs after application of arsenic, so that the specific and gradual action of the poison must be the important factor. Strangulation would imply an always sudden death of the pulp *en masse*, which evidently does not always occur, for complete death of the organ may be gradual and require several days. In other cases repeated applications may be necessary."

The claim that an insuperable barrier is erected at the apex of the tooth would indicate that it is a matter of indifference as to the quantity of arsenic applied. The inflammatory process will "mechanically occlude" the vessels so that no arsenic will pass this point. Yet the editor of the *International Dental Journal*, who should be an authority upon such matters, severely censures Dr. Burchard for failing to give emphasis to the necessity of using only minute particles of this "dangerous agent."

In a paper read before the joint meeting of the American and Southern Dental Associations in 1888 Dr. I. P. Wilson, the author, states, "The devitalization of the dental pulp should not, and usually does not, interfere with the vitality of the cementum; but from observations I have made from time to time I am led to believe that the life of the apical portion of the cementum, or that part not separated from the pulp by dentin, is sometimes destroyed with the pulp, resulting in necrosis, and ultimately in absorption or the solution of the lime-salts of the tissue of the end of the roots. We will almost always find this to be true in those cases where the canals have been filled for a considerable length of time, and yet there has continued to be a tenderness on percussion, and, indeed, the tooth will remain slightly sore the greater part of the time, but the sensitiveness experienced is that of uneasiness rather than that of real pain. This state of affairs is brought about by one of two causes: either the canal has not been filled perfectly to the apex, or the devitalizing effects of arsenic have been communicated through the canaliculi to the lacunæ, thereby leaving this portion of the cementum dead and inert."

Dr. Kirk, in a recently published paper (DENTAL COSMOS, August, 1898), says, "Broadly considered, any inflammatory action is a disturbance of the normal processes of nutrition, and this is true of both general and local inflammations, the disturbance being proportioned to the intensity of the irritative action. Where bacteria and their products are the excitants of the inflammation, their effective invasion is conditional upon the vital status of the tissue concerned. If the vital resistance of the tissue is sufficiently high it becomes immune, and bacterial invasion is impossible. The vital potential of a tissue is the result of the sum total of its nutritive processes normally performed. Any interference with the normal nutritive process therefore results in a diminution of the vital potential of a tissue, and renders it liable to invasion by bacteria with consequent inflammatory reaction. A disturbance of normal nutrition resulting in lowered vital resistance is therefore a precedent condition to effective bacterial invasion."

This is exactly what we may expect of the remote effects of arsenic, to lower vital tone, disturb nutrition, and by so doing invite infection. It is not claimed that any extended amount of tissue beyond the apex is as profoundly impressed as the pulp-structure, for if such were the case immediate expression of this pathological condition would ensue. The records of surgery furnish abundant evidence of encysted areas which subsequently break down and become infected through the circulation. This we believe is the rational explanation of pathological expressions occurring in the apical space of teeth which have been treated with arsenic.

If the suspicions which have been aroused in the mind of the writer have any foundation in fact, and if he has correctly interpreted his clinical experience, arsenic should no longer enjoy its universal popularity, but should give place to surgical procedure.

Ten years ago this would have been more difficult than it is to-day, and the difficulty to-day involves not so much the absence of other means, but aversion to a change of practice and the well-fixed habit which has fastened itself upon the profession of treating teeth for which no charge is made. Some of our best operators will assign two hours to a patient to fill a tooth with gold, and five minutes in which to destroy a pulp. If we can justly claim to be dental surgeons and not mere cavity-stoppers, this is not right and must be changed. One or two hours is not too long for the removal of a dental pulp, and a fee of ten or twenty-five dollars is not too much to charge for its accomplishment.

In view of what is generally known and has been recently written upon the subject of pulp-removal, it might seem unnecessary to describe methods which may be substituted for the arsenical treatment; but having called attention to the suspicion which I think should attach to the latter agent, I will as a matter of sequence outline a practice which does not involve its use, and from which, I feel certain, less baneful results will follow.

The first consideration of the surgeon is the necessity of operative procedure; second, that the patient and field of operation are in as favorable condition as can be obtained. These general considerations are not to be overlooked by the dental surgeon. No effort should be made to remove a dental pulp in a high state of inflammation. Antiphlogistic agents must be used until the irritation with its consequent dilatation of vessels has subsided.

My custom has been to flood the cavity with tepid solution of bicarbonate of soda; the cavity is then closed with a pledget of cotton saturated in cocain hydrochlorate for a few moments, care being taken not to allow any pressure to defeat the object of the application. If any excess of *débris* or accumulation of leathery decay is found in the cavity an effort is made to remove enough of it to gain access for subsequent applications to the pulp, not entirely uncovering that organ, however. Great care is taken not to cause any pain, for at the outset the patient has been assured that the treatment may take time and patience, but is to cause no pain. To break this promise at any time would be unfortunate, but to do so in the initial treatment would be suicidal to the confidence so essential to success.

A concave disk of vacuum cavity material, made by driving the reverse or butt end of an excavator into a sheet of the metal held on a lead or wooden block, is now adjusted to the cavity so that its edges will impinge upon the walls and prevent pressure. Under this disk a pledget of cotton saturated with oil of cloves is placed, the whole then being covered with temporary stopping. The gum over the affected tooth is painted with aconite and iodin in equal parts, and the patient dismissed until one or preferably two hours can be reserved for the operation. If pain has ceased and the excessive irritability subsided when the patient reappears, the pulp is cocainized with the electric current and removed. Here we will have to proceed cautiously, but the reward is in sight. Why should we not have patience? My practice is to use a minimum amount of current and a saturated solution of cocain. I have heard complaints of occasional failure of cataphoresis. A surgeon is full of resources: If cataphoresis is not successful in the fullest sense, it may be supplemented by injection or by the administration of a general anesthetic, preferably nitrous oxid gas. In all cases where teeth containing living pulps are to be excised or ground down, advantage is taken of the opportunity to remove the pulp under the influence of the shock of the excision. This can be done with no pain whatever, the apprehension of the patient being lessened by cutting the enamel with disks or burs, leaving only so much to be excised with the forceps as will not require any great stress or violence. A cone-shaped bur of suitable size is ready in the engine, clean and sharp; broach, etc., are to be ready, for the entire pulp must be removed instantly. The bur may not be necessary, but if the pulp is not freely exposed the bur should be plunged into the canal, the ragged orifice enlarged, and the pulp broken up. The broach is now passed quickly to the apex and the pulp twisted out in toto. It is needless to say that surgery finds its most inviting field in the single-rooted teeth. Success can be attained, however, with the molars as well, if the effort is painstaking. Surgery is not only more scientific, but when it is proven to be more successful a plea for this alteration of our methods of practice should not be unheeded.

PORCELAIN FILLINGS.

BY JOSEPH HEAD, M.D., D.D.S., PHILADELPHIA, PA.

(Read before the New York Odontological Society, November 15, 1898.)

THE subject of porcelain fillings has interested thoughtful minds for many years, and, while it gives me great pleasure to present a paper on this subject before so illustrious a body, I must at the beginning state that I do not pose as an especial expert. The method I pursue is not mine, but has been culled from all sources at my disposal; and while my personal experience may have given some new facts, these facts are insignificant and do not deserve special mention.

The process is probably familiar to you all, but the details have been so perfected and materials so improved that what was suitable to only a few simple conspicuous cavities in the anterior teeth now may be used for not only simple cavities, but corners and contours, from second bicuspid to second bicuspid, above and below. Less mechanical skill is required than is necessary to insert gold, but the artistic possibilities are unlimited; and, no matter how great the experience, eternal vigilance as to detail alone can insure continued satisfactory results.

And here I freely admit that my results have not always been perfect. At times my fillings have defied the closest scrutiny, but again, when success seemed assured, some little unforeseen detail has marred the perfection of the work. But now these eccentricities are so well understood that those who earnestly go into this field will receive a reward far greater than they anticipate. Even when the porcelain matches the tooth the cement may change the color, but, if the difference in the cement color be not too glaring, in three months the filling will have resumed its normal shade. This is only one of the difficulties to be overcome. There are many others, but of those I shall speak in their order, and without further premising, with your permission, shall proceed immediately to explain the operation as though you were all unfamiliar with it.

The cavity should be made cup-shaped and without undercuts. Should these be unavoidable through excessive decay, they should be filled up first with oxyphosphate of zinc. The edges must be perfectly sharp and at right angles to the grinding-surface where mastication is to be withstood; this is best accomplished by giving them a final smoothing with a small finishing bur.

The preparation of the cavity being over, a matrix or mold of it must be made in rolled platinum, one-thousandth of an inch in thickness. This platinum, if annealed in the Bunsen or blow-pipe flame, will be harsh and unfit for use, but if annealed in a muffle or electric furnace it becomes soft and tough.

It is placed over the cavity, the edges delicately defined with a ball burnisher, and then worked down to the bottom, care being taken not to shift the platinum after the edges have been outlined. Should the bottom tear it is of little moment, as the fused porcelain will not flow through the fissure, but, on the contrary, draw away. A tear on the edge, however, will surely make the filling defective in adaptation.

When the matrix is molded as well as the burnisher can do it, bibulous paper or cotton should be stuffed in, and thus a fairly perfect fit may be obtained. The edges are again smoothed down and the cotton withdrawn. This sometimes brings the mold with it, but if it does not the platinum should be teased out with sharp points; which procedure should be easily accomplished without distortion, as the burnishing has made the platinum stiff and springy. Platinum seems preferable to gold for making this matrix. Those who have used both find it tougher, quite as ductile, and, what is of greater importance, capable of standing any temperature desired. This last point is a vital one, as high-fusing bodies seem stronger and are more easily contoured than those that melt at 2000° or under. Their shades also seem less likely to vary in the burning.

The color of the filling must be decided by means of a shade ring, which, with the corresponding powdered porcelains, can be bought from the Consolidated Dental Manufacturing Company. Yellows, browns, blues, and white are the only colors which we desire to match in the teeth. The basal color of nine-tenths of all porcelain fillings is light yellow, and white, added according to necessity, will in an astonishing number of cases be all that is required to obtain a perfect shade. Whatever color is desired, first ascertain the basal color, add the toning material and this apparent difficulty will prove insignificant. The mixed body being wet with distilled water and dried with blotting-paper to the consistence of dough, is placed in the matrix and settled to the bottom by a few taps on the pliers that hold the platinum. It should not be allowed to quite come up to the edge. After being carefully dried it is placed in a Custer electric furnace and baked until a gloss appears, which takes from five to seven minutes. It is then removed, cooled, and placed again in the cavity, where the edges are once more burnished down.

This is the most important part of the operation. However perfect the first adaptation, the edges must of necessity have been warped by the unequal expansion and contraction of the porcelain and the platinum, but a second burnishing makes an adaptation that may be practically perfect. The half-filled matrix is now removed, contoured up to the edges with porcelain, and given the final baking. Should a third addition of porcelain be needed it can be given, but it is usually unnecessary.

When the baking is over the filling can be taken from the furnace almost immediately, as practically only very large pieces need to be slowly cooled, although theoretically a more gradual cooling will make the porcelain tougher. The platinum should now be stripped off, always pulling it away from the edge. Should it be pulled toward the edge, chipping is likely to occur.

The filling is now ready for insertion. Undercuts may be made in the cavity, and, where possible, grooves should be made in the porcelain by means of a thin diamond disk, care being taken not to chip the edges. If undercuts are not feasible, the gloss at least should be removed from the under side in order to give every opportunity for the cement to adhere. Finally the cavity and the filling should be washed in alcohol and dried, creamy cement, of a color corresponding as nearly as possible to the tooth, placed in the cavity, and the filling picked up by a little cement on the spatula and pressed home. The porcelain should be held in position for a minute or two until the oxyphosphate has lost its elasticity, for, no matter how perfectly the porcelain may have been fitted, if it does not go home into place the edges will be just as imperfect as if the old methods of one burnishing had been used. Thus a very creamy and slow-setting cement is essential. When the filling is in position, the setting of the cement may be hastened by a blast of hot air or a hot instrument applied to the porcelain. When the cement is wiped away and the tooth cleansed, paraffin or varnish should be flowed over the filling, in order that the cement may set for six hours before it is exposed to the action of the saliva.

On the following day the edge may be ground with a fine stone or polished with sand-paper. It is better for finishing that the edges should be a little too low than too high. If the porcelain is too high it can be ground down and still give good results, but the original gloss is in most cases to be preferred.

Having now described the operation of putting in a porcelain filling, a few words of caution and explanation may not be out of place.

Never attempt to put in a porcelain filling smaller than a pin head, as good edges will be difficult to obtain and the color will be lost.

In labial fillings make the cavities fairly deep, or the cement will shine through and ruin the shade.

In putting on a corner make the porcelain edge at right angles to the cutting-edge, or chipping will surely ensue. A bar of porcelain running into the tooth makes a much stronger anchorage than a platinum pin. The platinum may stretch, and certainly tends to weaken the substance of the porcelain.

In building up corners or large contours place a sliver of porcelain tooth, that approximates the color, into the mold and build the body around it. This prevents excessive contraction, and renders easy the construction of a sharp corner. With labial fillings and corners the exact color of the tooth should be obtained, but with approximal fillings that are well within the shadow of the teeth an exact matching of the tooth-color by the porcelain invariably means that the filling will look dark when inserted with cement.

That the shadow in between the teeth is reflected through the porcelain and held by the surrounding cement is possible, but whether this explanation is satisfactory or not, the fact remains that unless these approximal inlays are made much lighter than the tooth the completed filling will be too dark.

When handling small fillings keep the pliers and cavity wet. Capillary attraction will prevent the filling from dropping and being lost. When a tiny filling is ready to be inserted, place it on the operating case in the same relative position that it will take in the tooth. This prevents mistakes as to which side should go in first when the cement is mixed.

The positions most suitable for porcelain work are labial and buccal surfaces, from second bicuspid to second bicuspid, wherever the cavities are easily reached and the platinum readily manipulated; also approximal fillings and corners, from second bicuspid to second bicuspid; but there must be ample separation to allow the free removal of the matrix. This lack of separation will be responsible for more failures than any other one cause.

The farther back in the mouth the filling is placed, the greater crushing strain it has to bear; and, while I have many fillings doing good service in bicuspids, one or two have been broken. In reference to the so-called vital weakness of this work, the inevitable line of cement that holds the porcelain in position, I should like to say that eight years ago I filled teeth with the Timme bodies, and removed them four years after because they had darkened from the porosity of the material, but the edges were good and the cement was unwashed. With the Downie body, that came later, I had similar results; the edges were good but the color unsatisfactory.

My brother, who practiced many years in Spain, saw good glass fillings that had been in position eight years, and seemed likely to remain at least eight years longer.

Thus, in spite of all objections, the fact that good porcelain fillings cemented into place may last indefinitely commends this practice to the careful consideration of the profession, especially when we consider that porcelain, in appearance and substance, more closely resembles natural tooth-structure than any filling-material that has hitherto been used.

CORRESPONDENCE.

GUTTA-PERCHA AS A SEPARATOR.

To the Editor of the Dental Cosmos:

Sir,—The articles by Dr. C. N. Johnson appearing in your worthy journal I have read with interest, and I desire to call attention to certain facts that it would be well for all of the members of our profession to consider, particularly those who attempt to introduce new systems of practice, and especially those who, being young in experience and observation, are not likely as yet to have founded a comprehensive system exclusively their own that all the dental world can follow.

Dr. Johnson describes quite minutely a practice that was introduced by me years ago, and was known and practiced when you first entered the ranks. Justice therefore demands that I should claim what I have demonstrated in clinics before societies in this country and in all Europe, and published as long ago as 1881.

My use of pink gutta-percha is fully described in a paper read in Boston about 1878, in which are detailed my special applications of it in my practice since 1863, when I first saw the material in question, but more especially since I first used the electric mallet in 1870, in Delaware, and in 1871 in Philadelphia. Dr. Johnson writes in terms of most fulsome praise of gutta-percha—but he does not say what kind—as an ideal means of separating teeth preparatory to placing fillings upon their approximal surfaces, all of which I most heartily indorse after the most extensive use of it, and to a degree that Dr. Johnson, I know, has not reached.

There are many points in the use of gutta-percha that Dr. Johnson has not noticed. If he will turn to the *Dental Review,* after the report of the clinics given at Chicago in 1895 or 1896, where I read a paper calling special attention to "The First Uses of Pink Base Plate Gutta-Percha," and published in that journal, he will see how many of its virtues he has omitted to mention; among others, for inducing the perfect restoration of the alveolus at the cervix, to which the gum can cleave, forbidding the possibility of pyorrhea or its return if once so cured.

Now, when this is so widely known to the dental world, I think Dr. Johnson should give due credit to the man who has broadly introduced it to the profession. It is to be presumed that every one who reads the dental journals is conversant with the facts, and further, I am sure my young friend has heard me and heard others speak of my methods, for only two or three years ago Dr. McCandless was generous enough, when speaking of the great value of pink base plate gutta-percha before one of the societies in Chicago, to say, "In the way of parenthesis, I must tell you that it is not my idea, but to Dr. Bonwill is due all the credit, and its value cannot be overestimated."

Dr. Johnson, I have noticed, in all of his descriptions of shaping approximal cavities gives no credit to any of the older practitioners, and we are led to infer that he has thus early in his practice founded a system not hitherto known or practiced or published.

While I admire Dr. Johnson as a follower in the footsteps of others, and well calculated to save human teeth by the methods taught by him, yet he must not forget that the dental world has not been asleep for the past quarter of a century, and that the electric and other power mallets, and the dental engine, born and used long before he came into our ranks, led the systems which he is now exploiting; and it is hardly possible that some of us who have been the pioneers in their introduction, and who have used them in private practice, should have not seen very clearly that contour was the thing at last attainable, and would make easy the process of building immense surplus contours which hand-pressure alone could not.

I do not want to give offense to Dr. Johnson, as my criticism is not intended alone for him, for he has an army of those who keep him company in this sinfulness of omission.

The point I wish to make as a moral is that it would be wise for every author to give the proper credit to men who are known to have originated ideas, inventions, methods, and systems, not only as an honor due to them, but as an act of justice in recognition of their gift to dentistry, weaving it into a science which others could follow and save human teeth without themselves traversing the ground by which we are finding out our laws and building up systems.

When we learn to give to the pioneers their due, then the younger men in time, when they have won their spurs, will get a share.

I am writing a system of dentistry from a practice of forty-five years, which has tested my ability in the extreme. It has been shown to a committee to report on its value as enabling others to follow my so-called "wild methods."

When that is done, then I shall step aside for the younger men to originate and promulgate.

W. G. A. Bonwill.

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PROCEEDINGS OF SOCIETIES.

American Medical Association—Section on Stomatology.

(Concluded from page 74.)

Third Day—*Afternoon Session* (Continued).

Dr. W. Knight, of Cincinnati, read a paper in which, after presenting the main anatomical peculiarities of the temporo-maxillary articulation, and the pathological conditions to which it was subject, he reported the following case:

On August 9, 1897, I was asked by Dr. W. H. Creighton, of Cincinnati, to see a patient of his, Mr. B., aged sixty-five, who had suffered for five months past with an affection of the left side of the lower jaw. The disease had originated in the alveolus of the first molar on the affected side, giving rise to a necrosis of this process, which had gradually extended until the entire left arch of the bone had been invaded by the disease. On several occasions during the past few months Dr. Creighton had removed a number of fragments of necrosed bone, varying in size. At the time I saw the patient there was considerable tumefaction on the left side of the face, which extended from the lower border of the jaw as far upward as the zygoma. The soft tissues of the neck reaching from the mastoid process downward along the anterior border of the sterno-mastoid muscle were tense from inflammatory effusion. The parts involved were exceedingly sensitive to touch. An examination of the mouth brought into view a puffy, unhealthy line of gum-tissue which extended from the incisor to the post-molar region, from which pus was seen to exude from several points. A flexible silver probe was without much difficulty passed into one of these pus-openings, upward and outward, under the masseter muscle, until it reached the condyle. At various points along this course the grating sensation of disintegrating bone was painfully felt. No operation, except one to enlarge the explored sinus, was recommended at this time. In addition to this, a lotion containing aconite, opium, and stramonium was directed to be kept applied to the swollen cheek and neck, and the following prescription ordered: Tr. aconite rad., half-drachm; potass. acetatis, two drachms; tr. hyoscyam., one drachm; syrupi capsici, three drachms; aquæ q. s. add three ounces. Misce ft. misturæ. Sig., teaspoonful to be taken every two hours.

By this course of treatment the local swelling and pain of the parts was considerably relieved, and a threatening abscess under the chin was averted. In the course of a few days, the diffused swelling as at first seen had become localized to the immediate neighborhood of the temporo-maxillary joint, where some fluctuation could now be detected. This was relieved by the use of the hypodermic syringe, and a considerable amount of pus was removed from the joint by the aid of this instrument. The fear now was that the case would terminate in ankylosis, and the apprehension as to such an unfortunate result was enhanced when, a few days after the operation, a piece of cartilage the size of a small finger-nail was discharged from the sinus opening into the mouth. A careful examination of this specimen confirmed the belief that it was a fragment that had been cast off from the interarticular cartilage.

From this time on the case progressed uneventfully, and at the present writing, May 10, 1898, an unexpectedly good result has been attained. The movements of the joints are but slightly impaired. The mouth can be opened nearly to its full extent, but in doing this the jaw is pulled slightly to the affected side. The lateral or grinding movement is, however, more noticeably limited. The conclusion arrived at in this case is that the fragment of cartilage discharged came from the lower compartment of the joint.

The treatment of this case, in addition to that given above, consisted in maintaining a free drainage into the mouth and upon the surface. A wash for the mouth containing permanganate of potash was directed to be used frequently, and the sinuses were kept as far as possible in an aseptic condition by occasional injections of weak antiseptic solutions. His general condition was improved by the internal administration of small doses of tartrate of iron and potash, and Fowler's solution of arsenic given in alternate doses. Both of these remedies are known to have a constructive power in many vitiated conditions of the blood. The former acts by entering into the composition of some of the proximate principles of the blood; the latter remedy probably acts by modifying the vital conditions of its organized constituents.

We know from clinical experience that these two remedies are of signal service in hastening in many cases the formation of healthy granulations around necrotic bone, reducing in this way to a minimum time the separation of the sequestrum, and aiding to bring many cases to a comparatively rapid cure. Owing to the somewhat unusual history and present termination of this case, it has been described in detail. The result so far appears to be an excellent illustration of a disease being limited to one compartment of the temporo-maxillary articulation, and, although it is rather early to prognose as to the final outcome of the case, the conditions are now certainly favorable for a permanently good result.

The unhappy termination of comparatively slight injuries to the temporo-maxillary articulation in children can be best appreciated by bearing in mind the difference in the conditions of this joint in children and adults. Perhaps no writer has written more clearly and tersely upon this subject than has John Hilton in his work "Rest and Pain" (second edition, page 301), in which he says, "In adults the individual structures of a joint may be diseased, and each may present its own local indications of special local symptoms. Thus we may meet with isolated inflammations of the synovial membrane and ligaments, or a disease of the articular ends of bones in the adult."

Now, although these structures are at all periods of life necessarily continuous with each other, and closely allied in function, yet it is at the adult period, after the completion of their development, that each separate structure seems to have acquired, and henceforth to manifest both in health and disease, a structural independence which gives a character of individuality and isolation to the diseases of the different structures of the joint. In children all the structures of the joint must be formed, built up, and nourished in concert, and in due relation to each other. On this intimate sympathy existing between the different parts of a joint during childhood, or during the period of growth, depends the tendency to diffuse disease contemporaneously in all of the articular structures. Hence we see in our practice the quick propagation of inflammation from one articulation to another, and a rapidity of implication of the various structures of the joint in childhood and youth, which we do not observe at a later period of life.

This tendency to a rapid and complete involvement of an injured joint in children should be constantly borne in mind by the surgeon when treating any articular disease in the young. Especially should it be remembered that the discharge of pus from the ear in children is not unfrequently due to disease originating in the temporo-maxillary joint, and which is unfortunately at times not recognized until too late to prevent the disorganization of the articulation.

Affections of this articulation may occur at a very early period of life. Holt, in his work on "Infancy and Childhood," mentions a case of suppuration occurring in the temporo-maxillary joint at the early age of two weeks.

Acute arthritis in children is not a rare disease, and is a suppurative one from the outset. As late results there may be pathological dislocation, or a flat joint; occasionally complete ankylosis. An early evacuation of pus in these cases may aid them to terminate favorably, but in neglected cases complete destruction of the joint often occurs. If more attention were given to early manifestations of discomfort or pain occurring in the temporo-maxillary articulation of infants and children, we would not be so frequently confronted by distressing cases of ankylosis of this joint.

Treatment.—The treatment of acute affections of the temporo-maxillary articulation should engage the early and watchful attention of the surgeon. All remedial means, local and constitutional, should be applied at once, and persevered with until an obvious result has been obtained. Nor should his efforts be relaxed, neither should he be discouraged, even in those unpromising cases that apparently resist remedial measures, for by exercising patience he may bring to a successful termination a case that otherwise might result in complete ankylosis.

There can be no doubt that the local abstraction of blood in acute inflammatory diseases of joints, especially when this condition is due to trauma, is one of our most potent means of preventing secondary changes in the structures of the articulations.

This local depletion can be best accomplished by the liberal use of the leech. Six, twelve, twenty of these can be applied, according to the size of the affected joint and the amount of acute swelling present. For the temporo-maxillary articulation not more than four to eight are required. After their use, bleeding should be encouraged by the application of hot fomentations. If leeches cannot be secured, recourse can be had to the artificial leech or to the lancet. Internally arterial sedatives should be administered. The tartrate of potash and antimony, the mercurial compounds, and aconite, are remedies of recognized value in these cases. The successful surgeon will of course apply the general principles of treatment to each case committed to his charge, recognizing and meeting in each instance any special conditions of his patient that may in any way modify the local affection, whether this condition be of a temporary character or one of constitutional nature, as a rheumatic, tubercular, malarial, or a specific taint of the system.

I cannot refrain from urging again the decided benefits to be obtained in the cases under consideration by the local abstraction of blood in the early stages of these affections. I am confident that many joints have been preserved by this treatment that would otherwise have become useless, and I desire to enter a protest against the growing neglect of local blood-letting in acute synovitis, and in other acute inflammatory affections of the articulations.

In the subacute, and in those cases of a more chronic nature in which complete ankylosis has not taken place, we can hope to obtain good results in most instances by the prolonged and judicious use of counter-irritants, absorbents, and mechanical devices. Iodin applied externally exerts a mild counter-irritant effect, and also favors absorption of fibrinous exudate. Repeated blistering is of much service in many instances. The actual cautery, applied not directly over the joint but in its near neighborhood, is an effective mode of treatment. Mercurial ointments exercise a curative effect, and, although they have been extensively used in chronic joint-affections, they have been made of more value by the preparation of oleates of this metal, first introduced to the profession by John Marshall (surgeon of University College Hospital, London), who speaks highly of their utility in chronic inflammations when the seat of the disease is in or sufficiently near the skin. He says, "I may first mention that not only in persistent articular inflammations but also in simple synovitis these remedies rapidly relieve the tenderness and pain, and promote the absorption of the fluid effused into the joint. They are also of decided benefit in the rheumatic, the arthritic, and the mixed forms of joint-disease, but in these they do not supersede the necessity for general treatment."

He further states that "these oleates of mercury should not be rubbed in like ordinary liniments or embrocations, but should be merely applied with a brush, or be spread lightly over the part with one finger, otherwise they may cause cutaneous irritation or even produce a few pustules on the skin, especially in some persons."

After long use of these preparations, I have become more and more convinced of their great usefulness in chronic inflammations of joints.

Among the mechanical means to be employed to prevent or overcome a gradual tendency to the closure of the jaws due to disease of the temporo-maxillary joint are the various forms of shields, wedges, and gags that have been from time to time devised by dental surgeons, some of which have proved of service. Among these may specially be mentioned the device of Dr. Goodwillie, of New York (*Archives of Medicine*, New York, June 1, 1881), who, writing of chronic cases of inflammation of the temporo-maxillary joint, says, "The method that I employ is as follows: In this case the patient is under the anesthetic effect of morphin and nitrous oxid. If there is any rigidity of the muscles cautiously force open the mouth, and take an impression of either the upper or lower teeth; and a rubber splint is made from the cast to cover all the teeth in one jaw. Upon the posterior part of this splint is made a prominence or fulcrum, so that when the mouth is closed the most posterior teeth close upon it while the anterior teeth are left free. The next step is to take a plaster of Paris impression of the chin, and from this to make a splint. On each side of this splint is made a place for fastening elastic strips that pass up on each side of the head to a close-fitting skull-cap. When this appliance is in place and the elastic straps tightened so as to lift the chin, then pressure is brought to bear on the fulcrum at the posterior molar tooth, and so by these means extension is made at the joint and the inflamed surfaces within the joint are relieved from pressure; then immediate relief is experienced."

This method is an admirable one, and is based upon sound surgical principles, for it secures to an inflamed part rest, which is a condition so essential to be obtained during the process of repair. In cases which have terminated in complete ankylosis, operative treatment is the only way to insure relief. In some few cases of fibrinous ankylosis, if a diagnosis can be made, it is practical to attempt the division of the fibrinous bands, and after this to make use of mechanical appliances in the effort to restore the mobility of the joint.

Mr. Spanton, of Harley (London *Lancet*, April 16, 1881), published two cases of fibrinous ankylosis of the temporo-maxillary articulation, in both of which he proved the correctness of his diagnosis by dividing the fibrinous bands with a tenotome passed into the articulation. The patients were girls, aged nine and ten, respectively, and in both cases the disease of the temporo-maxillary joint had followed scarlet fever. Other surgeons have also reported instances of the same character.

It is difficult to make a diagnosis of fibrinous from bony ankylosis, but in a doubtful case the surgeon, before attempting a more serious operation, would be justified in using the tenotome to sever the fibrinous bands, and, if successful in this, to forcibly open the mouth and effect a cure by these methods.

In all cases, however, of bony ankylosis the only relief to be obtained is by an operation upon the bone itself, either by resection of the condyle or by Esmarch's operation. The first operation for the removal of the condyle was by Professor Humphrey, of Cambridge (*Association Medical Journal*, London, 1856), and was undertaken for chronic rheumatic arthritis. Since that time resection of the condyle has been performed by many surgeons, and the operation has been generally adopted. This operation usually affords relief, provided the entire condyle be removed. A mere section of the neck or a partial removal of the condyle has proved to be inadequate. The operation is usually unattended with danger to life, but occasionally fatal results ensue, as in the following case: Miss M. at the age of four years fell from a porch, striking upon her chin. Pain and some swelling of both temporo-maxillary joints occurred shortly after the accident, followed by gradual persistent and increasing stiffness of movement in these joints, until finally, some nine months after the receipt of the injury, complete ankylosis of the jaw became established. At the age of nineteen years she was brought to me by Dr. C. A. Schuchardt, of Cincinnati, as a patient for the Ohio College of Dental Surgery. Her appearance at this time was the usual one presented by the unfortunate subject of early and complete ankylosis of the temporo-maxillary joints. The marked dwarfishness of the chin, owing to arrested development, was as marked as in any case ever under my observation, but she experienced much less pain, and there was less irregularity and malposition of the teeth than is usual in these cases. Her desire for an operation was mainly due to the fact that I had relieved a friend of hers who had been similarly afflicted from infancy, and to whom I had given relief by performing a double Esmarch operation.

After an examination of the patient it was decided to resect the condyle. For this purpose she was placed in the Good Samaritan Hospital of this city, and the left condyle being the more enlarged was selected for the first operation. This condyle, which appeared to have become a part of the glenoid cavity, so firmly was it blended with the temporal bone, was removed in pieces. Three days after the operation the patient was in good condition and hopeful spirits. "I felt my jaw move on the other side," was what she said. On the fourth day, however, a secondary hemorrhage occurred. This was controlled by a gauze compress. Unfortunately, however, septic infection of a virulent form invaded the wound and shortly occasioned an arteritis, that extended rapidly along the external carotid artery, which probably had been injured during the operation. A malignant cellulitis of the adjoining parts occurred, and death resulted on the twelfth day after the operation.

There was no discussion of the paper, and the secretary read a paper by Dr. V. A. LATHAM, of Chicago, describing two cases of antral septicemia as follows:

Case 1.—Patient, a girl aged eight. Was first seen and treated for what appeared to be the usual spring discomfort, general *malaise* with slight symptoms of la grippe. The mother complained that the child was wakeful, and would stay up all night wandering in the bath-room, which was the warmest room in the house, at the early morning hours, and playing over the radiator instead of going to bed. On questioning why she would sit up, she said "she could not sleep." After some days the mother became anxious, and called a physician. The main symptoms were fever, which varied in degree more at night, ranging from 99°-101° F.; a muddy complexion, constipation,—gastro-intestinal irritation,—headache a trifle off and on, a reddening of the skin over the malar bone; extreme fetor of the breath, heavily coated tongue, no appetite nor thirst; some nausea. The teeth and mouth showed neglect, and were in a bad condition. The left eye showed catarrhal signs, the conjunctiva being injected and watery. Beyond these symptoms nothing else could be obtained, and the child persisted in saying her teeth were not sore and she had no pain, which statement her family agreed with. The usual treatment by free alimentation, mouth-washes, and tonics was given, and some benefit obtained. A few days later the cervical glands showed signs of swelling slightly on the left side, but were preceded by the submaxillary. I was asked to see the case. The history as given above was repeated, with the addition that to me the cheek seemed swollen a trifle. The mother thought it natural. After repeated questioning I learned, "This is just the same kind of trouble she had last spring, and also the year before, but the face swelled a little the first time; but the doctor said it was only cold, and the grippe would go away in a day or so, which it did." The child's staying awake seemed the dangerous symptom to the parents. The mouth seemed fairly clean. The gland was somewhat swollen and the cervical chain also. The teeth were carious, especially the temporary teeth, though only on the left side; no soreness, never had any toothache or abscesses. On palpation the cheek showed a slight difference in feeling and sensibility over the malar bone compared to the right side. The temporary first molar was decayed badly, but not loose at all. The gums around were reddened some, and judging the condition was septic, I opened the temporary molar and found a little thick pus in the pulp-chamber, and advised extraction, which was done, when more pus came down. The alveolus was cleansed, syringed, and probed for evidences of necrosis, but none were found. Antiseptic washes and general remedies were ordered. After three days the patient showed more swelling of the cheek, the eye being half closed. The bulging was pronounced, and there was a globular swelling at the buccal junction of the lips near the extracted tooth cavity. She complained now of "feeling as if she had a bad cold in the nose," with slight periodontitis of the teeth on the left side and redness of the gums, but denied pain or headache, much to my surprise. On examining carefully I thought I detected slight crepitation, which led me to suppose the antrum was involved. The symptoms continuing, I extracted the temporary second molar. The cavities of both first and second molars were thoroughly examined and probed with blunt and sharp-pointed steel probes, and no necrosis found, though evidences of roughening of the bone were felt. The danger lay in damaging the permanent teeth, but I thought best to open near the median line, and just in front of the permanent first molar to the alveolar buccal border, feeling for the cusps of the developing teeth. The cavity was drained of pus, washed with hot (98° F.) saline solution, followed by borolyptol solution till it came clear. Then some alcohol and cassia oil which had been thoroughly shaken in hot water was injected, and the opening packed to keep out food, etc. This treatment was continued for two weeks, then at longer intervals, and the opening allowed to close slowly. The patient reports good progress, and the permanent first bicuspid is slowly coming down.

The chief interest in this case lies in the following points:

First. The age of the child. This patient is younger than any other reported case I have found in the literature available to me, except one,—viz, the oft-quoted case of Dr. G. A. Rees (*Med. Gazette*, vol. iv, N. S.), mentioned by Tomes, Smale, and Colyer, of a new-born infant.

Second. The lack of usual symptoms, more especially the pain, swelling, tenderness, the discharge from the nose, roots of teeth, or abscess.

Third. The occurrence of some symptoms later, after the extraction of the first and second temporary molars.

Fourth. The periodical recurrence every spring for three years of a similar condition, as described by several members of the family; and the insomnia, so seldom seen in young children.

Fifth. The relative position of the antrum compared to adult life, and the difficulty in entering the same through the danger of displacing or injuring the developing bicuspids.

Case 2.—This patient was a medical student, blonde, aged twenty-three. Complained of severe facial neuralgia in the left side of the head. I was informed the patient had consulted numerous prominent physicians, oculists, and dentists, and tried various remedies for her trouble. Tonics, out-door life, and change of climate all were tried with the same result, the benefit being only temporary. The neuralgia continued, accompanied by a severe headache, and she finally consulted their oculist, who in consultation urged spectacles to be worn, and these seemed to benefit for the time being; when the trouble recommenced with severe earache, and taxed the patient's endurance considerably. The case fell into my hands through a mutual acquaintance who was anxious to get some advice, and I was anxious to see the case for its unusual history.

The patient having been engaged in laboratory work, it was thought the eye-strain was possibly due to the fine work, and the work was stopped. The eye was injected as is usually seen in neuralgia of the fifth nerve. Some interference of vision. The patient is of the nervous type, anxious, worn-out expression; has had catarrhal trouble in nose and throat; general history very good, outside the usual trouble. The teeth were in good order; three stoppings (of gold) only in the mouth, one small anterior approximal filling in the second upper molar, and the tooth seemed a trifle darker in color. This I suspected might be the cause of the trouble, but on testing by the various methods, no evidence of devitalized pulps or hypersensitiveness could be obtained. The third molar was in a fairly good position, though the crown turned toward the buccal fold; erupted fairly, and healthy so far as could be learned. On examining with a small electric lamp, the antrum seemed to be slightly opaque. Consultation was held, and the attending oculist vetoed the diagnosis of antral trouble,—inflammation,—but the family physician agreed with me that there was a possibility of its being the cause of trouble, and as there was small danger in making an exploratory opening the patient gladly consented. As she was becoming emaciated, nervous, and suffering severe pain, we decided to puncture through the canine fossa, obtaining some serous fluid with some flakes of fibrin. Covers were spread and a culture made, the result showing Streptococcus pyogenes albus and blood-cells, epithelial cells, mucous and salivary corpuscles mixed with micro-organisms and pus-germs. (Figs. 1 and 2.)

FIG. 1.

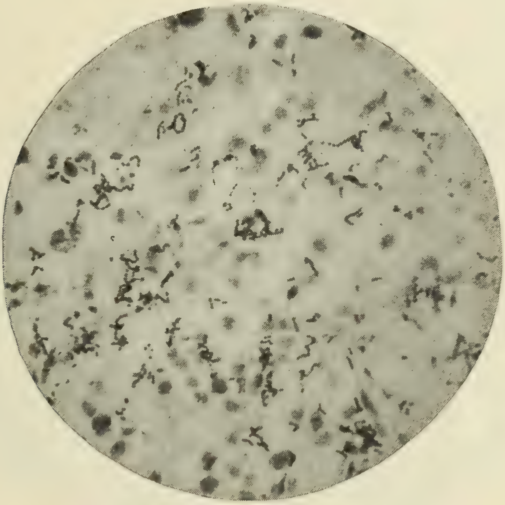
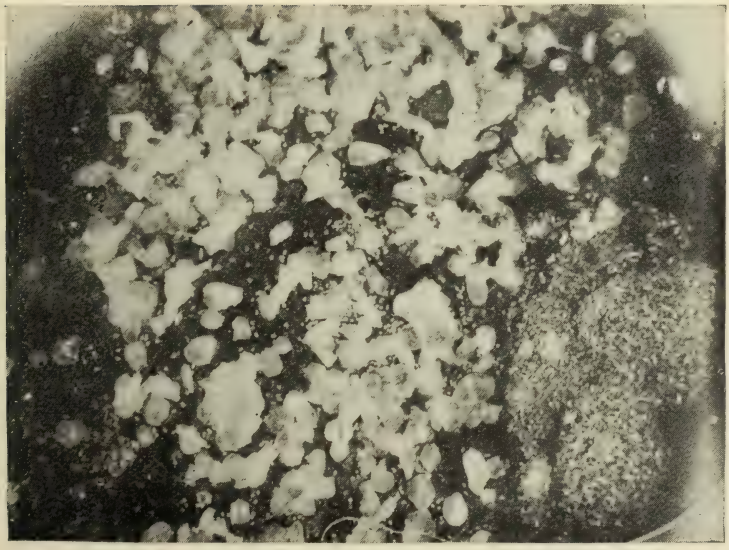


FIG. 2.



The opening was enlarged, washed with hot saline solution and then with mild antiseptic solutions, and a fine silver tube tied in. For two days the discharge continued, and the patient complained of severe earache and pain in the eye. The tube was cleared, and a thin, creamy pus oozed out, with small pieces of gelatinous tissue resembling the myxomatous structure of

FIG. 3.

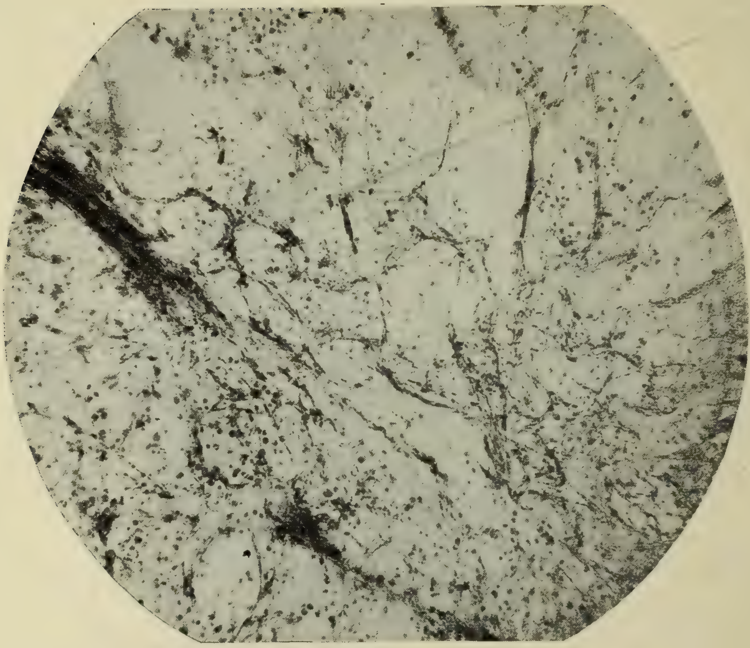
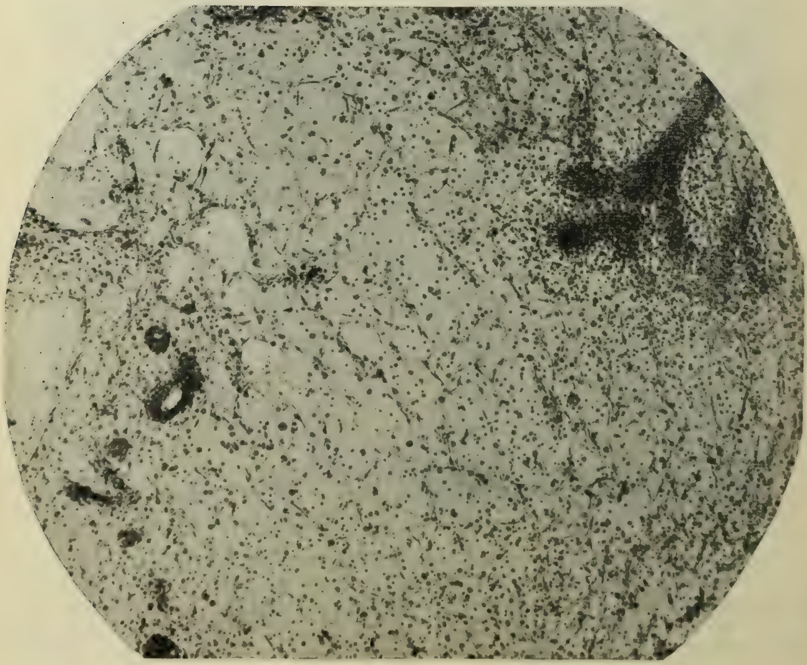


FIG. 4.



polypus. The opening was enlarged and a flexible probe passed through, and the surfaces carefully examined. The mucous membrane appeared to be somewhat thickened, and over or about the position where the roots of the third molar would lie, there seemed a nodular place with some softened tissue around. The antrum was again cleansed and then touched with carbolic acid and iodin, followed by a curetting, the fresh surface being washed with boric acid and one-tenth per cent. formalin (of forty per cent. solution strength), then cauterized with iodin; the tube inserted and plugged. The third molar was extracted for fear it was abscessed, although seeming healthy. The pushing up and engaging of the forceps caused the crown to break very easily, and on examining the tooth a large cavity with carious material was found, but the pulp was not exposed and the tooth was alive. The root is curved and slightly roughened on the apical knob, and evidently was the one felt in the antrum, and by pressure was causing necrosis and absorption. The case progressed well, though slowly, under tonics, local antiseptics, and packing, and up to the present time—nine months—she has had no recurrence of the neuralgia. An interesting point is the cause of such severe pain in that region, and what caused the carious tooth, for the coronal surface showed no evidence of fissures or cavities, as was testified to by a number of the examining physicians and dentists. There was no history of abscessed teeth, soreness or pain in any particular tooth, neither was any sensitiveness found with electricity, ice, or percussion; neither was the cheek swollen.

The myxomatous portions of tissue were hardened, and cut both by the freezing and paraffin method; stained in Weigert's fibrin stain, logwood and eosin, single and double. The photograph was made on Cramer's isochromatic plate from the sections, and shows the fibrin, blood-cells in normal and breaking-down conditions, and the attempt at organizing a tissue. Fig. 4 shows this very nicely, the developing blood-vessels and forming alveoli or meshes of fibrin in which a coagulum (mucoid?) substance is present.

Dr. ALTON H. THOMPSON, Topeka, Kansas, read a paper of which an abstract follows:

TOOTH-FORMS IN RELATION TO JAW-MOVEMENTS.

The writer hopes to enlist the interest of the Section in the cultivation of a better appreciation of at least one of the simple principles underlying this subject. It is not sufficient to say that these things are found in the text-books. The text-books are rarely studied, and the living principles must be presented over and over in our meetings in various forms of dress, that all kinds of minds may be reached and interested and lifted up.

To be brief, therefore, we wish to call attention first to the causes of the various forms of jaws and teeth found in the animal kingdom. In following the teachings of evolution we must understand that function is the cause of structure, and that organs are created in response to demand for the performance of functions. The teeth were therefore produced for the purpose of performing a function, and that function is the reduction and preparation of food for digestion. Not only were the teeth produced for this purpose primarily, but by the variations presented by the different kinds of food which animals came to employ they have been infinitely modified and many various types have been evolved. This adaptive modification has led to the almost endless varieties of teeth and masticating apparatus found throughout the animal kingdom, all of which are adapted to the reduction of particular kinds of food. Of course, to the primary function of food-reduction there must be added the secondary offices that the teeth are often modified to perform, as tools, implements, weapons, etc.

The food supply is one of the most potent influences in the environment of animals, and is second only to climatic conditions in determining the course and forms of life. The variation of the quantity or quality of the food supply has led to the modification or extinction of all the species that ever lived upon the earth. Gradual and persistent deviation has been the most potent for change in structure, while sudden alterations in the food environment have resulted in the extinction of whole genera of mammals. The work of differentiation and conformatory adaptation of the masticating apparatus and teeth has progressed onward through the eons, until the result at our station in the march of time is an extensive and most wonderful variation. But in all the variation and complexity of structure we observe a remarkable adaptation of means to ends, of instruments to purpose, of tools to material. The material is the cause; the tool is the result. The variations in the food supply caused the variations in tooth-forms.

The same law applies also to the evolution of the jaws and masticating apparatus,—the support and environment of the teeth,—which were developed by adaptive modification for the same purpose,—*i.e.*, the reduction of food preparatory to digestion. The teeth being merely the armament of the jaws, it follows that they were developed with them for the same purpose. The lower jaw or mandible has been described as a lever of the third class, in which the glenoid cavity is the fulcrum, the muscular force the power, and the resistance of food the weight. Since the coefficient of muscular force is one hundred and four pounds per square inch, it is easy to surmise that the tendency of the exertion of the great masticating muscles upon the jaws and teeth must be to react powerfully upon those structures directly subject to the resulting strains. The principles of construction and motion of the specialized parts devoted to mastication, and the precision and force with which this function is performed in the majority of animals possessing vertical mandibular occlusion, is wonderfully illustrative of the capacity of the animal mechanism for the display of power. The modification of the forms of the teeth and of their supporting mechanism is directly due to the force of occlusion and of jaw-movements. These tissues, like other parts, are disposed to develop in the line of greatest resistance in order to meet the demands of use. This is what Dr. John Ryder calls "displacement due to strain." He says further that "many of the parts associated in the function of mastication are greatly modified and brought to their present shape by the resistance incident to its performance. There are distinct kinds of mandibular movement, and each kind corresponds to one very distinct type of tooth. Thus in the carnivora the tubercles are laterally compressed and raised into sharp edges to form effective cutting instruments, the teeth being developed in the direction of the vertical movement of the jaws." In the opposite extreme, the herbivora, the lateral movement of the mandible causes the plication of the molar crowns in a line transversely to the direction of the strain exerted during mastication. As the excursive movements have increased in complexity there has been increase in the complexity of the enamel-foldings, ridges, crests, etc. It is concluded therefore that the various forms of teeth and mandibular articulations have been molded into shape by the jaw-movements and force of occlusion, and also that they bear a direct relation to each other and exhibit associated types that are constant.

To go into some detail, we find that in the lowest and simplest form of tooth,—that of the single cone, the reptilian type,—it is associated with a mandibular movement that is purely vertical,—mere opening and closing. This movement performs the one function of the teeth,—*i.e.*, prehension,—for division and mastication of the food is unprovided for in these animals. There is wide opening of the jaws, and after sharp closure a pulling motion is exercised. To resist these motions the teeth alternate above and below, and are long, conical, and sharp, and slightly recurved to hold struggling prey. The teeth and jaws are well adapted to perform their functional duties together.

Among the two great extremes of types are the Carnivora and Herbivora, with some intermediate and composite types which subsist on an omnivorous diet. The Carnivora, as you will recall, are possessed of a mandibular articulation which is like a simple hinge, that allows of but one movement of the jaw,—*i.e.*, opening and closing,—with no lateral excursion whatever. This movement requires the long canines and the long blades of the premolars to pass close to each other in the seizing and cutting of flesh, with a shear-like motion. The condyles are also shaped to resist the strong pulling motion which the curved canines are formed to effect in tearing flesh. The blades of the premolars and molars are developed vertically in the direction of greatest force to effect the cutting of flesh. The jaw-bones are short and stout, and the closing muscles strongly developed to effect strong vertical force. The Felidæ present this extreme modification, but there is a general departure from this type through the hyenas, dogs, bears, and other omnivorous animals which employ a mixed diet. The jaw articulation becomes more open to allow of some lateral motion of the jaws. The teeth become modified to the tuberculate form to masticate vegetable food, and the grinding teeth increase in number as the function of mastication comes more into use. In the Felidæ, the true cats, there are no tuberculate teeth and consequently no mastication, but in the more omnivorous carnivora there is development of number and tubercularity of the teeth, and the jaws of course become longer.

In the other extreme, that of the Herbivora, or the plant-eaters, we have in the Ungulata the best example of extreme lateral excursion of the mandible. This is due to the open temporo-maxillary articulation allowing extensive movements in various directions, but not much vertical play. There is also less density and diameter of the jaw, but much lengthening. By a peculiar arrangement of the dental tissues the wear of masticating preserves a constantly rough surface for the effective trituration of resisting vegetable fiber. The lateral movement of the jaws produces lateral extension of the teeth, in obedience to the law of development in the direction of resistance and use. The pigs show the first tendency to lateral movement, and have lengthened crown-crests to meet this movement in masticating. The tapir presents a little more lateral movement, and the kangaroo still more, with corresponding folding of the crown-crests. The rhinoceros, the horse, and their allies have a larger jaw excursion, and the ruminants most of all. The forms of the molar crowns follow the law of displacement due to strain, and in the latter class present many very complex patterns, as in the ox, deer, sheep, etc., owing to foldings and complications of the crown-crests. The movements of the jaw are lateral, antero-posterior, and diagonal, and in consequence the crowns of the molars are extended horizontally, with resisting ridges in every direction opposed to the horizontal movements. Other Herbivora, as the rodents, have complicated molar patterns also. Some of them, as the beaver, have molars composed of transverse plates of enamel which are so arranged as to resist the antero-posterior motion of the jaw, which is the main movement. This is also the main motion of the Proboscidæ, the elephants, mastodon, etc., which have ridges of enamel arranged transversely to resist this main masticating movement.

In regard to man, who is a simple bunodont of primitive type, there are limited antero-posterior and lateral jaw-movements, with slight crown-crests and cusps to oppose them. Like the bears and most omnivorous animals, the crests are weak, and tubercles for mere crushing are the most marked features of the occluding surfaces of the molars. The dentition of man is much like early types found in the eocene geological formations, which are much generalized, and from which the later more specialized forms were developed. Both his teeth and jaws are degraded if not primitive in type.

NEW YORK ODONTOLOGICAL SOCIETY.

A REGULAR meeting of the New York Odontological Society was held on Tuesday evening, November 15, 1898, at the New York Academy of Medicine, No. 17 West Forty-third street, New York city; the president, Dr. S. G. Perry, occupying the chair.

REPORT OF THE CLINIC COMMITTEE.

Dr. J. F. P. HODSON. I have only a very short report to make of the fine clinic we had this afternoon, which was very largely attended. The demonstration was by Dr. Joseph Head, of Philadelphia, who baked a porcelain filling for a corner of an upper central incisor and inserted the same,—a beautiful and artistic operation. As the paper Dr. Head is to give us this evening deals with this subject, it will be well to defer any remarks relating to the clinic until that time.

Incidents of Office Practice.

The President. The way down which we have come as a profession is marked by the tombstones that have been erected over many of our dead hopes,—our expired expectations. To-night we have presented to us a new remedy for sensitive dentin, and it remains to be seen whether we who are enthusiastic over it will have to erect another tombstone over another dead hope. I think not; still, it will be proven in a short time.

Mr. Evans brings us a new preparation of cocain, which he will describe. It is used for the purpose of reducing sensitiveness in the teeth. I will say that in my hands it has been a surprise from the beginning, and I have used it over a week. Sometimes I have thought I should never see the time when I could operate on a sensitive tooth without causing pain, for the simple reason of the density of the tooth; but this remedy seems to operate differently and penetrate more thoroughly than anything I have ever seen. In a few moments' time I have been able to operate upon almost any tooth I have found; not with perfect comfort, of course, but almost entire comfort, even in cases of extreme sensitiveness of the dentin. Mr. Evans heard the report of one lady upon whom I used it,—an extremely sensitive person, who dreaded the operation extremely; it was used in a tooth that would hardly bear the touch of the instrument, yet in two or three minutes I had no trouble, after using the remedy, in proceeding with the operation.

I want to ask Mr. Evans to give an account of the medicine and the theoretical reasons he has, from the chemical standpoint, for the expectation of success he seemed to have when he came to me with it. We have made considerable progress in our profession in the last year. I think our last meeting will have considerable influence in checking the making of gold fillings in the front of the mouth, and the placing of gold crowns in conspicuous places. Now we have a clinic in the same line, and a paper on the same subject; so we have made a great step toward more artistic work, and if we can crown our labors by the introduction of a remedy that will obtund sensitiveness of the dentin shall we not have reason to say that this year, at least, has been fruitful for us all?

Mr. Evans. I thank you very much for permitting me to present this matter to you. I will pour some of this ethereal solution of hydrochlorate of cocain fifteen per cent. into this glass, and you will see that there is some subtle energy which causes it to creep up the sides of the beaker and after a little while leave a deposit of cocain salt around the edges of the vessel. I have put together the following statements in connection with the theory, which seems always necessary when a new obtunder is introduced.

Mr. Evans then read the following paper:

Vapocaine. (Penetrating Solution of Cocain Hydrochlorate, Fifteen Per Cent.)

Dr. W. Ostwald says, "The history of any development, coupled with its evanescent theories, frequently gives sound material for a new theory."

Progress in the scientific conception of chemical phenomena depends upon primarily determining the several properties of chemical energy as such, and the relation of said properties to thermal and other forms of energy. Every word spoken, every thought formulated, and every sensation of pain lead to sources of chemical energy. The ultimate problems of biology are in every respect chemical.

In reviewing the many theories and the brief history of some pain-obtunding processes, some credit should be given to all the failures which have contributed considerable advantage to an investigation at this time. It was a surprise to find that they all required a similar form of energy to that which compels ether to creep up the sides of a beaker, and leave its evaporated salt on the surface of the glass. It was partly in consequence of this observation that vapocaine was produced.

In the dental tubuli this ethereal cocain solution penetrates chiefly by thermal energy, rather than by capillary attraction. The evaporation of the ether causes pressure, which drives the moisture out of the tubuli and forces the vapocaine in. The ether then evaporates by the heat of the mouth and leaves a deposit of cocain hydrochlorate on the sides of the tubuli, which deposit is at once redissolved in the following manner: When the ether is dissipated by the heat of the body the natural fluid of the tooth again fills the tubuli, and acts as a solvent for the cocain salt. The penetration of this solution, which expands by heat, will thus be more rapid, and the amount dispersed greater than where an aqueous solution is used.

The following experiment will serve to show that vapocaine penetrates the tooth-structure by the aid of thermal energy, causing the expansion of the ether:

Take a fine capillary tube, about four inches in length, and wrap around each end a piece of absorbent cotton. Then saturate the cotton at one end of the tube with water at the temperature of about 100° F., and allow the water to nearly fill the tube. Then saturate the other piece of cotton with vapocaine, and surround it with a heated vessel, such as a beaker or crucible. Vaporization of a portion of the ether will at once ensue, and the vapor will completely drive the water and a small portion of the vapocaine out of the tube. As the water is dissipated through the tube more vapocaine is forced in, and, if heat be evenly applied through the length of the tube, the ether is volatilized and a deposit of cocain is left on the sides of the tube. When the ether is completely dissipated the tube will again fill with water, which dissolves the cocain as it passes along the tube.

This experiment was merely made in the laboratory to see whether or not there was any truth in the theory which gave me some enthusiasm when I went to Dr. Perry. We saw the indications that there was something to be discovered, and, looking in the direction where we thought it ought to be, we have found it in ether. We have found in vapocaine a substance which will exert a subtle form of energy which will distribute a salt through dental tubuli, and then permit the fluid which is in the tubuli to take the place of an extraneous cocain solvent, and act as an obtunder equal to anything which you could drive in, either by mechanical, electrical, or any other form of energy. It is our hope that this may turn out as we expect, and we shall be very glad indeed to have it subjected to the severest criticism and the clinical test of all who would like to try it.

Discussion.

Dr. A. L. Northrop. I have had this preparation for nearly a week, and have used it in a number of cases with the greatest satisfaction. In one case the teeth were extremely sensitive, and, after applying the rubber-dam, I made an application of this etherized solution of cocain; in less than five minutes I was able to excavate the teeth as thoroughly as was necessary. I at once made the remark that if we had had this a long time ago there would have been no necessity for a machine to electrically apply cocain. I am very highly pleased with it; it is very seldom I can give as hearty approval of a new remedy as I can of this. If it continues to serve me as well as it has thus far, I shall be able to relieve a great deal of suffering.

Dr. W. W. Walker. I have used a great many obtundents for sensitive dentin, but none I have used has given me such entire satisfaction as this one; and I think it will prove very useful.

Dr. J. Bond Littig. I tried the remedy to-day, and if it acts in every case as it did in that I think we have just the material we need. It certainly took all the sensitiveness away in less than five minutes, and I could excavate readily where before I could hardly touch the cavity.

Dr. William Jarvie. I have always been a little shy of obtundents of all kinds, believing that perfect dryness and a very sharp instrument would be the best means of getting rid of sensitive dentin; but when Mr. Evans was kind enough to leave some vapocaine with me a week ago, I tried it. During the few days that have elapsed I have had comparatively few cavities to fill that have been very sensitive. They have been rather comfortable cavities for the patients, and I have only tried it in two cases, one being on the grinding surface of a lower molar, in which there was no decay, but where it had been worn away by attrition so much that it was necessary to protect the tooth by filling. Such cases are frequently exceedingly sensitive to the instrument, and yet it is necessary to get an undercut to retain the gold. In this particular case, after cutting for a moment or two the pain became almost unbearable; and the patient was a man who will stand a good deal. I applied some of this etherized cocain and left it in contact with the dentin for three or four minutes, when I found I could cut without giving any pain. After cutting a while the surface again became sensitive, and I renewed the application; after which I succeeded in completing the excavating with comparatively little discomfort. In the other case the cavity was quite large and the decay soft, and I used the vapocaine with quite good effect. I am a little diffident about recommending anything of this kind, because we have been enthusiastic over so many other things which have not turned out as we hoped they would. I do not claim for it all the virtues,—I have not tried it long enough,—but I will say that I advise every gentleman in the room to get some and try it for himself.

Dr. W. J. Turner. I have used it in two cases, and it was very effective in both. One was for an extremely nervous young lady, for whom I had never worked before. I applied it immediately after the cavity, which was very sensitive, was dry, and when I got through excavating she said she "never had such an easy tooth filled before." It was almost without pain. In the other case the effect was similar.

Dr. O. E. Hill. I have never used obtundents to any great degree. I have always been afraid of cocain, because of the distressing experiences of some early after its introduction. I have used this remedy on a boy about twelve years old, in a lateral incisor which had a large cavity and was very sensitive indeed. I applied it twice, and excavated the tooth with far less trouble than I ever before had with him.

The President. In the beginning I used it for the particular patient of whom I spoke. It happened to come in the nick of time, and it astonished me completely. I also used it in a large number of cases where there was extreme sensitiveness, and in no case did I find that I could not reduce the sensibility, if I only applied a little more when I got to a very sensitive place and waited a few minutes for it to penetrate.

Dr. Jarvie. Were you particular about its coming in contact with soft tissue?

The President. Not especially; several patients reported a sense of numbness of the cheek, the tongue, and the lip, such as the other cocain preparations produce. To my surprise, it seemed to penetrate the tooth even if it was not first made dry, although probably not as much as when the tooth was made dry.

Dr. Tracy. I have tried it in a number of cases. I should say my experience corroborates what has been said to-night. It saved much time and nervous energy that both the patient and myself would have lost. I heard the expressions of many patients in the office, and they all were very well satisfied.

Dr. S. C. G. Watkins. The subject of cocain has been before you for some time this evening, and I would like to speak a moment along another line of the subject. No doubt all of us destroy pulps to a greater or less extent in our practice, and have more or less difficulty in doing so with the use of arsenious acid. I am happy to say that I have not used arsenious acid since August last, for the anterior teeth, for the purpose of destroying pulps, and I do not think I ever will again. While attending the National Association at Omaha Dr. Patterson told us how, with the use of cocain, he destroyed pulps, or rather paralyzed the nerves in the pulps, so they could be removed without pain. I will simply describe that method. The rubber-dam is applied if possible, and where the pulp is exposed finely powdered hydrochlorate of cocain is introduced into the cavity and worked with an instrument into the blood or serum which oozes from that pulp. Then a piece of ordinary rubber, such as is used for making vulcanite work, is introduced in the cavity and pressed firmly. That pressure forces the cocain into the pulp, and, after waiting two or hree minutes for it to act, remove the rubber, run your broach into the pulp and extract it without any pain. The pain caused by the pressure of the rubber on the pulp in that way is slight. The cavity can then be filled at the same sitting without any danger. I have used this method several times since August, and have had just the satisfactory result that I have described.

Dr. S. FREEMAN. If Dr. Watkins would use a hypodermic injection of cocain he would do much better, and in less time.

Dr. WATKINS. I took the same stand at Omaha. I had used the hypodermic syringe many times for that purpose. I thought I was right, but after I got home I thought it worth while to try the method which had been spoken of so highly; and, after using it, I never want to use the syringe again.

The essayist of the evening, Dr. JOSEPH HEAD, of Philadelphia, then read his paper, entitled "Porcelain Fillings."*

Discussion.

The PRESIDENT. We would like to hear from Dr. Ottolengui. He has had considerable experience with porcelain fillings.

Dr. R. OTTOLENGUI. I may say I am *getting* experience with porcelain fillings. I have not had any experience in the line that Dr. Head has suggested; that is to say, practically the same method of using high-fusing porcelains that was, so far as I know, first introduced some years ago by Dr. Land. I have had some experience with the so-called glass filling-material, which, as I imagined, was a high-fusing glass; and latterly with Dr. Jenkins's material, which is really a low-fusing porcelain. I have taken the body for experimental purposes and baked a pin in it, and then I have ground the porcelain across the pin and found it without any appearance of porosity. Moreover, it will sustain a polish after grinding.

The essayist of the evening says this work requires no more mechanical skill than to make a gold filling. The essayist also said he does not possess unusual skill. He is modest; he has very unusual skill, as the majority of gentlemen will find when they undertake to repeat his clinic in their private offices. In all the descriptions of this kind of work (and I have read a number of them) the writers tell you "to burnish the matrix to the cavity, and, having obtained your mold, go ahead." Having obtained your mold, you may go ahead; but, in my experience, to obtain the mold, except in the most accessible cavities, requires the very highest degree of mechanical skill and ability. It requires a nice bit of calculation in approximal cavities to know whether you have enough space. You may get a matrix so well adapted to a cavity that the cavity will appear to be gold-lined, and be unable to get it out because there is not space enough; and, of course, if you cannot get the matrix out you will not be able to get the filling in. There are cases, too, where you can get the matrix out and yet cannot get your filling in, because the extra space made by the cavity itself is missing when you have contoured your tooth. In some cases, where it was most desirable, I have found it impossible to get space enough to get my filling in when I made it, even by grinding from the inner side. In one case I got all the space I could by separation, even using the wonderful little apparatus of Dr. Gillett; and, after two or three attempts to make a proper filling, I finally filled the cavity with gold, which, fortunately, I still know how to do.

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*Printed in full at page 140 of the current number.

The tendency to spheroid is a great difficulty in contouring. You build the corner very nicely, put it in the furnace, and it comes out wrong; you have a lump instead of a sharp corner. When I first used Dr. Jenkins's body it seemed to be a retrogression from the glass fillings,—that I could not manage contours as I could with the glass; but I am getting experience, and it seems to me now the secret of managing the Jenkins body to make contours is this: instead of attempting to obtain it in two or three bakings, it becomes necessary to obtain it by baking a great many more times, because it seems that body which has once been fused is less likely to spheroid or ball in subsequent baking. Have the first layer simply cover the matrix. I use the most velvety form of spunk, instead of paper, for burnishing; then the next time build up so the matrix will be full. Suppose you are making a corner; begin to build, taking care not to use much material on the labial surface. Add on a little of the body each time, being satisfied to let it grow by degrees. I made a lateral incisor corner this week, and I baked it six times; but when I put it in the mouth I had the satisfaction of seeing that I had produced the contour I aimed at. However, I am not satisfied with the results I obtain. I did some work last spring for a patient, telling him at the time that it was not satisfactory to me. He asked me to recommend him to some one in Paris. I gave him the name of a prominent gentleman there whom you all know. I said to him, "I expect to do that over when you come back, as it does not suit me." On his return he told me the gentleman in Paris was delighted with the work, and called his assistants in to see it.

I mention those fillings particularly as an indication that in Europe they have lower standards than we have; not Dr. Jenkins, but the other men do not seem to care if they do not get fine edges. Their patients have demanded cement fillings for years, and the porcelain fillings do not show so much cement. A cement was introduced in Atlanta by a man named Doyle which might serve our purpose, and I have set one or two fillings with it. It is little more than an ethereal solution of celluloid, and I fear it will not last; but it is invisible. To test it a few days ago I put in a corner, set it with this Doyle cement, and put a wedge between the teeth, knowing that I would get more space at the next visit in that way, and at the same time I would insure the immovability of that filling. When the patient came back I had no difficulty whatever in removing it. If we can get a good cement we could get a perfect filling.

The most difficult place in connection with the matrix is where the approximal cavity extends practically to the gingival margin. We get the rubber-dam on and keep it there perhaps, but the cavity margin is not on a line with the rubber-dam. To get a sharp edge of the matrix and not have the gold or platinum wrinkle at that point, is exceedingly difficult. The result will be, in a great number of cases, that your filling laps, and that is just what we condemn in a filling,—that it should lap at the cervical edge. After allowing the filling to set thoroughly, there is no difficulty at a subsequent sitting in finishing this Jenkins body with fine sand-paper and polishing it as you would gold. To all intents and purposes it can be made perfectly smooth.

The President. Do you use Dr. Jenkins's gas apparatus, or do you use electricity?

Dr. Ottolengui. I went over to Dr. Van Woert's last week to try the electric furnace, but it is so constructed that I cannot use it. I have been using a furnace lately constructed by Dr. Kingsley. It has the advantage that the blow-pipe is a part of the furnace. Instead of being held in the hand, it is set permanently under the hole of the furnace. I have Dr. Jenkins's furnace in the parlor, and I have the other in the laboratory.

Dr. J. Bond Littig. It has been my experience with all the low-fusing bodies that the great difficulty is getting a contour, and we must keep baking and baking and adding on until we get the contour; while with a high-fusing body we can get the contour by baking once or twice. I think you will all find that if you partly fill the matrix with body before it is withdrawn, pressing hard and squeezing all the water out of it, you will not have half the contraction you would otherwise have. I have gone all through this matter of making porcelain inlays, having used the Timme method and many others. So far, I find nothing new in this. I always place a portion of the body in the matrix before I remove it. I use platinum, but have difficulty in getting it soft and pliable and trouble in getting the mold I want. I have only recently obtained an electric furnace, so I cannot speak advisedly on the relative value of gas and electric furnaces; but I should judge the color would be better maintained in the electric furnace than in the gas.

Dr. Wm. Jarvie. I rise to express my gratification at the line of thought that is being expressed this evening. It seems a continuation of the subject we had a month ago, when we were denouncing the unnecessary display of gold in the mouth. If we could all do such work as we have seen to-day, it would seem as though it were not necessary to use gold at all in the front of the mouth. Certainly, the specimens that have been handed around and the specimens in the mouth of the essayist would indicate that most beautiful and artistic work can be done with porcelain, and work that will withstand the test of time; certainly, such work will last as long as the ordinary gold fillings. Gold fillings do not last forever; possibly these porcelain inlays will not, but, with a suitable cement, I do not see why inlays should not last even longer than gold, because they would always be likely to maintain a smooth and polished surface, and be less liable to collect deposits that would tend to disintegrate dentin or enamel.

I rose more particularly as the mouth-piece of Dr. Van Woert, who is not able to be with us. He is very much interested in this subject, and he has sent some things for you to see which are in the line of some thoughts that have already been expressed. I have here the handle of a tooth-brush in which are drilled a couple of holes, one representing a cavity in the grinding surface of a molar, and the other a cavity on the labial surface of an incisor. Here are two inlays that fit the cavity in the molar. One of these inlays is made from Dr. Jenkins's material, and the other from the material furnished by the Consolidated Dental Manufacturing Company. The inlay made from the Jenkins material certainly has not nearly as fine a surface, nor is it as dense in texture as that made from the Consolidated Company's material. The edges of the Consolidated Company's material are sharp, and as clearly defined as though cut with a stone. In the other the edges are somewhat rounded.

Dr. Van Woert has also sent a little device which he has originated to assist in making the platinum or gold matrix to fit the cavity. Mention has been made of the difficulty of getting the matrix of gold or platinum perfect, and Dr. Van Woert's method of accomplishing this is as follows: After the cavity has been formed, say in the labial surface of an incisor, a little "ideal base plate" is put on one of the points of these pliers and an impression taken of the cavity. That is hardened by cold water, and a softened piece of the same material put on the other point. The hard material pressed into the soft material makes a complete male and female die, and with them can be made a perfect matrix to fit your cavity.

The PRESIDENT. Does it tear the platinum?

Dr. JARVIE. Not at all; and the device can be used in all cases where you are able to take an impression of the cavity.

Dr. OTTOLENGUI. The doctor has brought here a cavity cut in a piece of tooth-brush and two pieces of porcelain, one made of the Jenkins body, and the other of the Consolidated Company's body. All this is true, and I think it is rather fortunate that I am here, because I made that cavity in that brush myself, and I made that Jenkins body inlay myself. As I said before, I was unable to use Dr. Van Woert's furnace and could not use my own, and that was fused in the open air and is no test whatever. That must not be taken as a sample of the Jenkins body.

Dr. JARVIE. In regard to porcelain bodies, I should think the advantage would be in using the denser material if you can make with it an inlay with such edges as are shown on the one Dr. Van

Woert has sent. The matter of spheroiding is simply a question of the degree of heat to which the material that is being employed shall be subjected. If you should use 3000° of heat, when 2000° are sufficient, the material will spheroid. The Consolidated Company's material will spheroid also if you subject it to more heat than is necessary to bake it.

Dr. Jos. Head. The field seems to have been so covered by the remarks of the learned gentlemen present that there is little to add. I feel, however, that I must emphasize the fact that the higher fusing body keeps its shape much better than the low-fusing. The tests I made with the Jenkins body indicated that it was less tough than the body now made by the Consolidated Company. One remark of Dr. Ottolengui's surprised me very much, and, with your permission, I should be glad to give him a chance to explain. He said the Jenkins body does not tend to change its color under heat. I am very glad to hear that, because it adds another virtue to the Jenkins body that I did not know it possessed. When I was in New Jersey, Dr. Ottolengui said (if I am not mistaken) that it made no difference if one overheated the first bakings of the body if care was used with the last baking, as color was entirely made by the last baking. Now, if the Jenkins body does not tend to change its color under heat, why is this extra care in the final baking necessary? I hardly think Dr. Ottolengui's method can be accurately called the Jenkins method. The Jenkins method, as I understand it, essentially and distinctly dwells upon the fact that there is one burnishing given to the matrix, which is invested in some asbestos. Thus the Jenkins method has all the weakness of the old single-burnish process, as it is extremely difficult to think that a soft asbestos investment is capable of counteracting the distortion that must arise when porcelain is flowed into the matrix, and the unequal contractions of the metal body necessarily occur. I may have been unfortunate, but all the fillings that I have seen manufactured by the Jenkins process have been marred by chipping or some other incidental accident that prevented the perfect edge which those who use the second burnish get with considerable ease.

Dr. Jarvie. What do you mean by the second burnish?

Dr. Head. When the matrix is first drawn from the tooth, the body is baked in it so as to be clear of all the edges. It is taken from the furnace and cooled, and replaced in the tooth, and the edges burnished down a second time. The final contour of the filling is then added, when a second baking gives practically perfect edges.

Before I close, I should like to say that there is no particular place that I get my platinum. Its softness depends upon the way in which it is annealed. The Baker Company, of Newark, is a most reliable firm. By writing to them, platinum foil of 1-1000, 1-2000, and 1-3000 of an inch can be obtained. The grades can be used according to the size of the filling; the larger the filling, the thicker the foil. Where the foil is subjected to the open flame of the Bunsen or blow-pipe it is invariably harsh, but where it is annealed in the electric furnace, and subjected to a white heat and kept free from gas, it becomes extremely pliable. If the platinum is desired to be more pliable, as pliable as any metal can be made, the thin foil should be immersed in a crucible filled with charcoal, and the covered crucible heated to a red heat for about twenty minutes.

Dr. OTTOLENGUI. Dr. Head has repeated the language I used in Newark with remarkable stenographic accuracy, for which I commend him; but it is my fault that I did not express myself so as to fully give my meaning. When I said in Newark that one need not be particular about the baking until the last, because that would give the result, I meant rather that it was not especially necessary to fully flow the first amount of body that is put in; but, even if it were overbaked, that the final baking would make the color right. I did not say that heat would not have a tendency to take the color out of this body. It will, very materially, and if you bake the body without protection of an investment then it is not at all difficult to overbake it, and you do lose the color.

Dr. HEAD. I would only say, in closing, that the advantages of the high-fusing body over Dr. Jenkins's body, and all other low-fusing bodies, lies in the fact that the color of the high-fusing porcelain is more stable, it keeps its contour and its strength, and gives a result that is permanent and pleasing.

Dr. OTTOLENGUI. The advantage of the Jenkins body for this work is that you can maintain your color, and the reason seems to be, whilst it is possible to thoroughly fuse this body in this furnace, you can scarcely do any more. He seems to have the body so constructed that there is no danger of overbaking. You keep your eye on it, and as soon as it is thoroughly fused it will match your shade sample.

Adjourned.

W. J. TURNER, M.D., D.D.S.,
Editor New York Odontological Society.

AMERICAN DENTAL SOCIETY OF EUROPE.

(Continued from page 91.)

FIRST DAY—*Morning Session* (Continued).

THE following paper by Dr. L. C. BRYAN, Basel, Switzerland, was handed in and read by title:

GOLD, METAL, AND PLASTIC FILLINGS WITH THIN STEEL MATRICES.

Introduction.—The difficulties of building up contour fillings, either of gold or plastic filling-materials, have been so great that the profession has sought for some form of matrix which would be adjustable to all teeth, and would allow of any desired contour being built up. The rigid matrices, such as Jack's, Miller's, etc., are so inapplicable and so difficult to secure in place, that the time consumed in their adjustment is too great to render their adoption general with the profession. Those with wedges, screws, or other complicated means of retention in place are impracticable for the general practitioner. Various efforts have therefore been made to produce a matrix which would be adjustable to any tooth, would entirely inclose it, and yet be of the thickness and rigidity necessary for stability. All the round ring matrices of copper, German silver, or tin, interfere with proper adjustment, owing to their thickness, if the adjoining teeth are in contact.

Composition.—Some years ago I gave a great deal of time to finding some substance which could be used to make a matrix of sufficient strength which would yet not be so thick as to interfere with the proper adjustment, even where the adjoining teeth were in close contact. The result of my researches was the adoption of the thin rolled steel used by watchmakers to support the pendula of clocks. This is admirably suited to the purpose, and the manufacture of the matrices from it is very simple; any dentist can make them in his spare time, and keep a stock of them always on hand.

Advantages.—As has already been stated, the great trouble with most matrices is their difficulty of adaptation, necessitating some kind of wedge, screw, string, shellac, or other means of adjustment to the tooth to be filled, or to be wedged against the adjoining tooth, and their inflexibility makes it impossible to give any other contour than that of the rigid form of the matrix, and on the removal of the matrix a space is left of the thickness of the matrix, which the contour of the filling should have entirely filled up. On the other hand, these thin steel matrices can be driven or "bellied" out in any direction before a gold or metal filling, if enough play is left and not too tight a matrix selected for the case.

Another advantage which this latter kind has over the former is, that when the matrix is removed from the tooth, the filling occupies the interdental space fully, which cannot be the case where thick steel, German silver, or copper matrices are used.

Further, these matrices may be carried over and between any two adjoining teeth, wherever floss silk can be drawn through, without disturbing the position of the teeth or wedging them apart; thus the space for contouring the filling is decreased, the thinness of the steel being such as to allow of excellent adaptation to the form of the tooth, and the matrix being easily trimmed with the smallest shears, can be readily adapted to the gum and cavity margin without giving pain.

It may be added that when in position and adjusted under the gum-margins they completely isolate the tooth from the moisture of the mouth, if well-fitting; and treatments requiring entire absence of dampness can be accomplished without adjusting the dam. I have filled approximal bicuspid and molar cavities with gold or plastics without the rubber, simply absorbing the saliva in the mouth with bibulous paper, or with the saliva pump.

For the application of arsenic to the pulp for short treatments, and for covering them with a protecting temporary filling, these matrices are useful, avoiding, as they do, the use of the dam, it being possible to build up such a filling within the matrix, leaving it after the removal of the latter.

As has before been stated, the matrix when applied to a tooth can be trimmed with the finest embroidery scissors, so thin is the steel of which they are made. Thus they can be adapted to any irregularities of the tooth or gum-margin, and accommodated to the articulation of the opposing teeth, and can be left on the tooth for some hours if desirable, especially in large contour fillings, where the bite might cause the breakage of the filling if the matrix were removed.

A theoretical objection has been made that these matrices have perpendicular walls, whereas the filling should always be somewhat rounded and have a globular form. Practically I have found no disadvantage in having straight walls to the matrices. If it is to be left on the tooth, I build up a filling on the gingival portions and on the crown, sufficient to allow of trimming down, when the matrix is removed, to the wished-for contour and globular form. If the matrix be removed on the completion of the filling, particles of filling-material can be added to the outer surface to alter it to any desired form, and the filling having been packed solidly into the matrix before its removal gives a solid body to work on and add to.

Method of Manufacture.—The matrices may be made according to the following directions, which have been practically tested by me for many years:

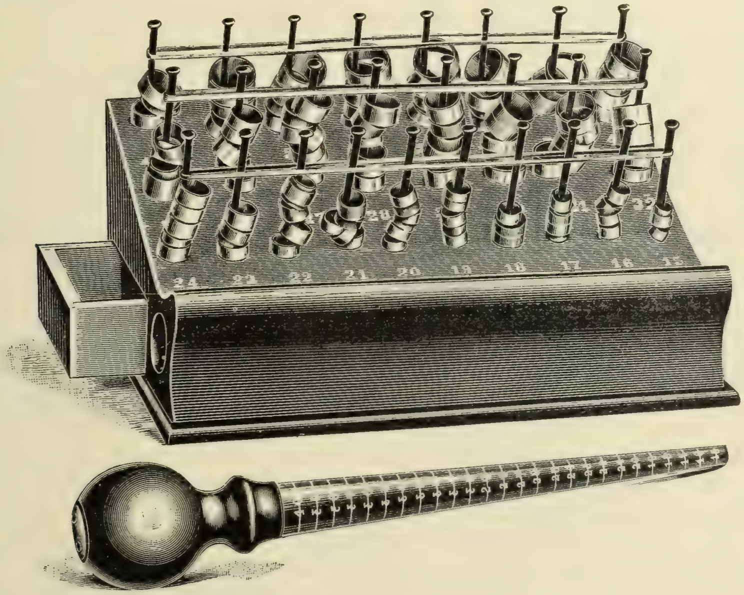
Cut the thin steel into strips of the desired length, adding one or two millimeters to allow for overlapping. After cleaning them from all foreign substances, rub the lapping ends with the ordinary acid for soft solder and join them. Hold the ends together with small solder-pliers, lay a bit of soft solder over the joining, and hold them in a small alcohol flame. Before the temper has left the steel, it will be found that the solder has flowed into the joint. Remove with a file any superfluous amount, and when the whole set is made, place them in strong soda water and boil them till the acid, which would otherwise rust the steel while lying in stock, is entirely removed. Then dry them, oil slightly, wipe them, and place on the stand.

When they are to be much used for amalgam fillings, and one does not wish to take the trouble of keeping the soldered part away from the amalgam, it is desirable that this part should be lightly coated with shellac or sandarac varnish. The soldered portion can then come into contact with the amalgam without fear of its being dissolved out, and causing the matrix to spring open when in use. It is, however, enough when the matrix is not so varnished, to take a little precaution to keep the soldered part away from fresh amalgam.

Numbering.—Any ring measure, which a dentist could make himself, having a circumference of fifteen millimeters at one end and of forty-five at the other, would answer the purpose of measuring the matrices and determining their arrangement on a stand, according to the size denoted by their numbers. These measuring rods or mandrels may be composed of wood, iron, steel, or brass, and should be divided into at least twenty parts by lines encircling the rod, each line being so numbered as to denote the circumference of the measure at that point, and consequently the circumference of the matrix corresponding to it.

The matrix corresponding to the first line is twenty millimeters in circumference, and is about the smallest that would ever be used, although it might be well perhaps to have one of fifteen millimeters circumference. That corresponding to the last line on the measure is forty millimeters in circumference, and is the largest ever needed.

The matrices most used for bicuspids would be represented by the numbers 23-28, and those for molars by the numbers 32-36, inclusive.



It would be well in making a complete set of matrices to have half-sizes between the above-mentioned most used numbers, and each size should be made in three widths.

Arrangement.—These matrices should be arranged and kept in some kind of order,—not allowed to remain loose in a box. The most convenient way of arranging them is to place them on pegs or pins fixed in a stand. (See illustration.) These pegs should bear numbers corresponding to the numbers on the matrix measure, which are obtained as described above.

Method of use in Amalgam Fillings.—For building up a metal crown on a root, I insert a retaining screw, which is a common small, brass, wood screw, with the point filed down, set in cement in the root. Adjust that matrix which will represent the form of the tooth-crown, and rub the amalgam into the matrix with a pellet of paper. I seldom use any amalgam pluggers for amalgam fillings, the work of packing all being done with the point of pliers directing the small firm pellet of Japanese bibulous paper. This method secures better condensation and expression of the mercury than could be accomplished with the amalgam pluggers.

After building up a tooth of this kind around a retaining point, and seeing that the bite is correct, I allow the matrix to remain for several hours and cut it off at another sitting, when the filling can be polished and trimmed.

The matrix can be pressed and held to the margin of the tooth if it extends beyond the gingival margin of the cavity by pressing paper, cotton, or gutta-percha between it and the adjoining tooth at the gum-margin. I prefer leaving the filling in the matrix extended out beyond the cavity at the cervical margin and contoured parts; finishing the filling afterward by grinding away what is superfluous of the filling-material, thus giving a natural rounded contour to the tooth.

No other matrix on the market can be removed without injury to the filling, or the danger of breaking the filling, which has required a considerable amount of time and trouble to insert, when a large amalgam filling occupies the interdental space and contours the tooth to the adjoining one. With these matrices there is not the slightest danger of such a catastrophe; with them, after removing the little wedge of paper or gutta-percha which may have been used to take up the slack, the matrix can be forced to the cervical margin of deep-lying cavities, and then is easily lifted off. It is preferably removed from one side only, canting it over in one direction. If the filling is very large and liable to break, the best method to be pursued is to put a pellet of gutta-percha pressed onto the teeth and held with the broad-pointed instruments on the articulating surface of the filling, causing an even pressure on all parts of the upper surface of the filling, and pressing the gutta-percha or paper with the broad-pointed instruments while the matrix is being lifted off. If the filling has been packed in so that it fills the matrix entirely, the best plan is to slip an excavator, or pointed instrument, in between the matrix and the tooth-wall, thus splitting or cutting it off from the tooth at one side. Then the matrix can be drawn up laterally by catching it at the soldered part and drawing it up from the filling while the pellet is placed on the articulating surface. Thus the matrix can be lifted steadily upward and removed from the interdental space and the tooth. The surface of the filling can now be dried and wiped smooth with gold cylinders, small pieces of tin or silver foil, to absorb the mercury around the edges of the filling and to quickly harden it. Before removing the matrix, the patient should be made to close the teeth to see that the bite does not endanger the contour of the filling, after the occluding points have been cut away with a spoon-shaped excavator to the approximate form desired.

I am much impressed with the advantage of a large contour filling entirely closing the interdental space, as it is a well-known fact that a rounded amalgam filling is much less liable to shrinkage than one crescent-shaped. We have the best results from a thoroughly contoured amalgam filling. I know that in this I am differing from a large majority of the profession, who prefer to leave the so-called "self-cleansing" space, which must have received its name from the fact that one has to cleanse them one's self. I have seldom found such spaces not filled with particles of food, sooner or later causing fresh decay at the cervical margin, whereas a contoured filling occupying the whole interdental space and resting with a broad surface against the adjoining tooth, being thoroughly well polished, gives the greatest comfort to the patient and affords the best protection to the two teeth affected. The cervical margin should be smoothed with burnishers while the amalgam is soft, or ground off after it has hardened. In this way we get an ideal restoration of the tooth-crown as nature intended it to be.

Where I have much interdental space or recession of the gum, together with pyorrhea teeth, I build up a huge mass of amalgam in the whole space between the teeth and even along the root outside the cavity to the existing margin of the receded gum, and after hardening and trimming and polishing this square shoulder of the amalgam at the gum-margin, the gum can be induced to grow down again and fill the space. I do not leave enough space to collect food in the process of mastication between the filling and the gum. I have now some cases in which I have cut the shoulder of amalgam away after about a year, and have been able to bring down the gum, which had receded seriously from the neck of the tooth in a so-called self-cleansing space, nearly to its original position, and have thus given great comfort to the patient. I have in my own mouth such spaces filled in this way with large masses of amalgam, and since having them so treated have realized the comfort of having these food pockets entirely closed up with a smooth mass of amalgam.

The same theory holds good for gold, but it is difficult to fill with gold beyond the cavity margin and thus fill the space.

Method of use in Gold Fillings.—In gold fillings I pack with gold, taking either some soft gold cylinders (or tin and gold for a base), in bulk much larger than the whole cavity, and forcing them down into the matrix and irregularities of the cavity with paper pellets applied to the surface of the gold with the pliers, as in packing with amalgam, or with Powers engine mallet and malleting on the paper pellet with the automatic engine, hand mallet, or right-angle mallet. This exercises a general pressure over the whole surface of the gold, and is much superior to the plugger points used direct on soft gold, as the gold does not curl up from the side in packing, and "rock" as when malleted with the points, if the gold be not held down with a second instrument. For adaptation to a large surface and to the cavity walls, after pressing down with paper and getting a level surface on the gold I remove the paper and mallet with the small points.

After the whole surface of the gold is condensed pretty thoroughly, I proceed to put in another layer of soft non-cohesive gold cylinders, which I also press down with paper pellets, and then mallet in with my pneumatic mallet, driven by an air-pump on the dental engine or by other means. The former is my adaptation of the pneumatic mallet, driven by an air-pump, to the engine which has the Rauhe right-angle points. A contour can be given to the gold in the matrix and very securely malleted in, and if there are any undercuts or difficult places to fill in the matrix around the margin of the cavity, these can be filled in after its removal, and proper adjustment given to the gold over the margins of the cavity.

Hard or cohesive gold can be malleted on to soft gold bases, which should form about one-half or two-thirds of the approximal cavity filling; or the entire filling can be made up of any desired form of cohesive gold. In this way any wished-for shape can be given with much less trouble than by carrying cohesive gold on to the walls of the cavity without a matrix.

The matrix also holds the filling without retaining-points until the body of the filling is inserted. When the filling has reached the upper enamel margin, and before it is finished with heavy or other gold used for the purpose, the filling being well secured and anchored in the mean time, I remove the matrix, either by cutting it, if tightly fitting, or by removing the wedges by which it has been held around the cavity margin, and finish the filling about the occluding surface without a matrix. At the same time I search with a sharp excavator for any soft points along the margin of the cavity, and drive cohesive gold into them to make a perfect finish to the margin. Any one not accustomed to the use of these matrices will find many such places at first, but experience with them will soon teach one to leave the matrix loose along a line representing the margin of the cavity so as to allow sufficient extra gold to pack down, and to allow of the most thorough malleting between the enamel and the walls of the matrix. The soft gold used for the lower half of the filling in the matrix will be found, when thoroughly condensed, to make a good margin and will finish up smoothly and durably, quite as much so as cohesive gold, with the advantage of better adaptation and less liability to leakage.

I cut away the enamel on the cervical margin and extend the cavity margin out to a line, where, in brushing the teeth, the brush thoroughly cleanses the margin of the filling. After polishing the cervical and other margins, I find the best burnisher to be one of the now obsolete Herbst rotating instruments, with conical points. The various members of that once famous system of burnishers serve good purpose in finishing up the surface of fillings. These can be made by taking the shanks of broken engine burs and rotating them on a stone or sand-paper till they are brought to a point. Some should be made with blunt and thick points, some with thin and sharp ones, to run in between the teeth and polish, condense, and solidify the margin and body of soft gold in the contour. I have also some finishing burs made the shape of the white flame burs, but with perpendicular blades which cut sharply and well in both directions, forward and backward, and trim down the cervical margin of the cavity most satisfactorily, without lifting up flakes of gold, which are likely to curl up if the ordinary finishing burs are used. One of these burs in cross-section would show somewhat similar form to a twenty-rayed star, and they differ radically from the burs which cut forward only, in having perpendicular blades.

Recently I have been making contoured approximal gold fillings of combined soft and cohesive gold in molars and bicuspids with the matrix, but without the rubber-dam, which is difficult of adjustment, finding that when the matrix goes well down on the neck of the tooth, and under the gum-margin, satisfactory results are obtained. In such cases I burnish the margins by rubbing on the surface of the matrix, and finish burnishing the filling before removing it, as in removing it blood, serum, or saliva unavoidably get on the filling and prevent a fine polish or finish, especially of the soft gold of the base of the filling.

(To be continued.)

THIRTIETH ANNUAL CONVENTION OF THE SIXTH, SEVENTH, AND EIGHTH DISTRICT DENTAL SOCIETIES OF THE STATE OF NEW YORK.

THE above-named societies met in annual convention in Ithaca, N. Y., October 26, 1898. Dr. A. S. Barnes, of Oneonta, president of the Sixth District Society, presiding.

FIRST DAY—*Afternoon Session.*

The convention was called to order at 4 P.M., and Dr. BARNES made a short address in behalf of the Sixth District Society, welcoming the sister societies.

The minutes of the last session were read and approved, and on motion adjournment was had to allow time for the several societies to hold their regular meetings for the transaction of business.

Evening Session.

The evening session was called to order at 8 o'clock, and Dr. F. L. AMES, president of the State Society, addressed the convention, giving a short review of the progress of dentistry from an art to a science, and finally to a profession. He read a letter written by Eleazer Parmly, in which he told of his start in dentistry in 1815, when he said there were less than a dozen in the United States who even called themselves dentists. He deplored the fact that comparatively so few practicing dentists become members of the societies, saying that the membership of state and local associations included scarcely sixteen per cent. of registered dentists, and he exhorted the members of the societies to increased effort toward bringing all reputable practitioners into the societies.

On motion, a vote of thanks was tendered Dr. Ames for his address.

Dr. CHAS. S. BUTLER, of Buffalo, read a paper on "Articulation and Prosthetic Dentistry," of which an abstract follows:

Beginning with a short history of the progress of medicine from the days of Hippocrates down to the present time, it was shown that prophylaxis was always considered an important feature of medical practice, so that now many diseases having their origin in unsanitary conditions seem about to be stamped out, and sanitation forms an important part of municipal government. So he said, the duty of dentists is rather to preserve teeth than to furnish artificial substitutes for those which are lost, but still the time can never come when artificial teeth will not be needed.

He spoke of the distinction between the words occlusion and articulation as applied to the teeth. Occlusion should be used to describe the position of the teeth in regard to those in the opposite jaw when the mouth is shut; articulation, on the other hand, is the act of closing the jaws. The first is passive, the latter describes an action. This distinction is wholly lost when the words are used interchangeably.

Although mechanical principles must form the basis of all prosthetic work, the result will be in a high sense a failure unless the effect is an artistic success. Therefore the dentist must be artistic to satisfactorily supply dental substitutes. It is not enough that the plate fit, that the teeth be so perfectly ground to the plate that the joints be indistinguishable and the plate finished so smoothly that the tongue can find no fault with it. All these things should be, and something more. Life and nature must be imparted to it, or the dentist will fail to obtain the highest possibility in dental prosthesis. Until recently it had been a question how nearly a dental plate could be made to imitate the movements and expression of the natural teeth. Much very good work had been done by different practitioners, but it had not been reduced to rules. There had been no system of charts and plans such as an architect prepares before beginning to erect a building. There seemed to be no rules for construction applicable to all cases, no underlying principles. Some years ago, however, Dr. W. G. A. Bonwill presented a system, the result of careful study of the anatomy and physical functions of the jaws, with an attempt to at least approximate them in the construction of artificial dentures, which appears to be scientifically correct, and capable of guiding to results not heretofore attained. The system starts with the idea that the inferior maxilla is based upon an equilateral triangle.

By the careful measurement of several thousand skulls of different ages and races, Dr. Bonwill found that the average distance from the center of one condyle to that of the other was about four inches, and lines drawn from the center of each condyle and meeting at the median line of the incisors would form an equilateral triangle. There was occasionally a slight variation, but never more than a quarter of an inch. From fourteen to sixteen teeth are found in each jaw within this triangle, so arranged that no tooth strikes only one tooth in the other jaw, but they always occlude so that the upper tooth touches two of the lower. This arrangement seems to maintain the regularity of the arch when one or more teeth are lost from either jaw.

The upper teeth project over the lower, not only anteriorly, but posteriorly as well, and the depth of the overbite varies as the depth of the cusps on the bicuspids, while the ramus curves upward and backward in proportion to the length of these cusps and the overbite.

The overbite gives the incisors their power of cutting food, the operation being similar to the action of a pair of shears.

Without the curvature backward and upward of the molar line the teeth would have to be flat on their grinding-surfaces to admit of lateral motion, and much more power would be required to masticate the food.

In artificial teeth it was formerly thought that only up and down motion could be made useful, as a sidewise movement would tip the denture and throw it out of position. With the knowledge that Dr. Bonwill supplies us we know that artificial teeth can be so constructed that all natural movements of the jaw can be made useful, and this knowledge revolutionizes our practice.

Not all the credit can, however, be given to Dr. Bonwill, for several others have done valuable work on the same subject, for instance, Dr. I. B. Davenport, of Paris, Dr. Hans Block, of Dresden, and Dr. W. E. Walker, of Pass Christian, Miss. To the latter especially are we indebted for his study of the glenoid fossæ and the movements of the mandible, and for the discovery of the fact that in the act of mastication the condyle on the side whence the jaw recedes in its sidewise movement not only comes forward, but travels downward as well.

The careful study of this subject is important to all who construct artificial dentures, for a plate under the best possible circumstances is liable to cause injury and irritation to the mouth, and anything that will lessen this danger will be worthy of our attention. There is no special study to which we can devote time with greater promise of practical benefit than this temporo-mandibular articulation. The movements of the condyle are an important factor in our work, particularly in their bearing upon the study of the cusps of the natural teeth, with a view to bettering the articulation either of artificial dentures or of the natural teeth in treating pyorrhea alveolaris; also in the treatment of disease in the facial muscles, the treatment of adhesion, etc., and in the broader and more extensive field of crown- and bridge-work.

Discussion.

Dr. W. A. Barrows, Buffalo, said that it was not only the province of the dentist to save rather than destroy natural teeth, but it was his bounden duty to save in every possible case and to teach his patients to take every care of the teeth that would prolong their usefulness. His idea of the difference between the meaning of the two words occlusion and articulation was that occlusion meant simply shutting the mouth, but articulation includes all of the motions, lateral, forward, and the closing of the jaw as well. A dentist to achieve any worthy success must be so artistic and so well informed of the natural movements and appearance of teeth that artificial substitutes will simulate as closely as possible both in appearance and function the natural organs.

He was proud of Dr. Bonwill's discovery of the fact that the lower teeth were based upon an equilateral triangle. His study of the teeth and jaws enabled him to establish the principle of proper construction of artificial dentures, and his articulator built in conformity with this principle furnishes a means by which we can do better work than we could with any other.

Dr. F. A. Greene, Geneva, had been much interested in Dr. Bonwill's paper on articulation when it was published, but did not think the principles would apply to artificial teeth. If artificial teeth were placed upon a plate in the position natural teeth were in a normal mouth, they could not be used. When they are placed on a movable base, they must be so placed that the use will not disturb the position of the plate. As a theory it is very beautiful, and if we could put a plate in the mouth and fasten it there, it would without doubt work like a charm, but it will not do with a movable plate. Dr. Bonwill's researches gave us matter worthy of thought, but we cannot articulate artificial teeth as natural ones are articulated. In his opinion the improvement of artificial plate-work was hindered by the present method of charging for the work. The only basis of the charge should be, as it is in operative dentistry, the time and work required to do the operation.

Dr. A. M. Holmes, Morrisville, agreed with Dr. Greene that in practice it was very difficult to carry out the ideas advanced by Dr. Bonwill on articulation, and it would be still more difficult to get patients to pay for the increased time required to do so.

Dr. F. H. Lee, Auburn, said there were many cases in which he could not use the Bonwill articulator to advantage.

Dr. F. L. Ames, Albany, said that the paper was interesting from a scientific standpoint, but he did not believe that a set of artificial teeth made with the same dip from the bicuspids to the third molar that is found in natural teeth would work. He had spent hours in getting the cusps of artificial dentures to set right when they were in the articulator and had had to remove some of the points of the cusps to make them work right in the mouth.

Dr. Henry H. Tompkins, Utica, said he had used Dr. Bonwill's articulator and method for several years, and in a good mouth could get very gratifying results. Every time the teeth come together the plate is carried to place instead of being dislodged, but the principle is not one which can be learned in one or two trials. It must be studied patiently till mastered, if it takes a week to put up the first set. After that it is about as easy to make them this way as any other.

Dr. Butler, in closing the discussion, said he regretted that the members seemed to misunderstand the purpose of the paper. It was not intended to advocate a special articulator. It was rather to describe the motions, proportions, and positions of the teeth and the jaws. Still he could not understand why the same articulation could not be used in an artificial plate as is found in nature. It would seem that the nearer we approached nature the more perfect our work would be.

In the matter of getting the bite. When the mouth is so that the teeth come close together you get one occlusion, but if you ask a patient with an edentulous mouth to close the jaws you have a condition in which the molars will not get together. Dr. Greene said that a set of teeth articulated according to Dr. Bonwill's system could not be made to be useful; this could only be because the articulation was made without reference to the dropping of the condyle, as shown by Dr. Davenport and by Dr. Walker. If this principle had been kept in view the plate would certainly work satisfactorily.

Dr. TOMPKINS spoke of the difficulty of getting a proper bite. While he was attending college he had difficulty with a case; he could not get the patient to close his mouth naturally. Upon telling the demonstrator of his trouble, the demonstrator placed the trial plates in the patient's mouth and, speaking suddenly and emphatically, told him to close his mouth quick. The result was that the articulation was right. Since then he had followed the same course with success in every case.

There was no further discussion, and the following paper was read by Dr. F. B. DARBY, of Elmira:

SUMMING UP OF THE PULP-CANAL QUESTION.

No operation in dentistry is so diversified as the treatment of pulp-canals. It is supposed that every man has a reason for the faith that is within him, and every dentist will undertake to explain and defend his "modus operandi," but nevertheless this infinitesimal cavity that plays so important a part in the comfort and welfare of the tooth has always been a victim of eccentricities, ignorance, experiment, and nonsense.

If one will follow closely the journals of the day he will be impressed with the fact that no one system has been adopted that may be considered universal, or even regarded as standard practice. There has been a revival of the subject during the past year: the journals have been unusually full of it, writers have expressed their individual opinion freely and told the "best way" to treat pulp-canals.

After reading consecutively twelve articles from the pen of as many different authors who trod the pathway from mummifying pulps up to a scientific and rational treatment, it was suggested that a little time spent in assorting, throwing out the worthless and holding on to that which was good, might possibly result in creating a system which could safely be adopted, at least by the non-investigating dentist who is not quite satisfied with present results, but still has not the time or inclination to pursue the new radical methods, such as the chemico-metallic, of Dr. Weld and others.

It is not the purpose of this paper to criticise the methods of individual practitioners. It would take too much time, but I do want to extend my sympathy to the man who can find nothing better than iodoform, with its vile, penetrating odor; or the man who believes that in "union there is strength," as is verified by his combination of essential oils, escharotics, astringents, germicides, antiseptics, and what nots, six or eight in number, with which he attacks the pulp-canal, when any one of them would answer the purpose indicated.

I regard with envy the man who can successfully drill canals to the apical opening and stop there, but I question the advisability of the average dentist accepting it as a method to be depended upon.

I have no confidence in a method which does not require the rubber-dam, for the treatment, whatever it is, must be thorough in every detail; thorough asepsis, thorough drying, thorough filling. I am willing to concede to every dentist the privilege of filling root-canals according to his own fancy, with any material he may elect, providing he fills it full, fills it positively. It makes but little difference what the material is, if the treatment has been right.

A dentist who has any consideration for his patient or for his own peace of mind will be very careful about applying arsenic to a living pulp when even slight inflammation is present, and he will be very careful to secure it by positively sealing. If he be a dentist of refined sense of procedure, he will not undertake it with sandarac and cotton; it is too nasty and slovenly, and is not positive. Owing to decomposition, it makes the mouth offensive, not only to the patient but to his friends.

Temporary stopping made of wax, gutta-percha, and whiting is always positive, not offensive to the taste or sight, agreeable in every way, easy to introduce and sure to stay.

After arsenic has been applied to a pulp, let it alone; do not be in a hurry; three or four days is usually necessary to prepare it for easy removal. Do not undertake it until disintegration begins, so that the pulp readily loosens its hold upon the walls and is removed without leaving shreds or dislodged portions clinging.

Now we come to the treatment of pulp-canals. First, open the chamber thoroughly, then apply sulfuric acid, fifty per cent.; saturate the pulp with it; a single thread of cotton on a fine broach will accomplish this in a few moments; this shrinks the pulp, loosens it from the walls, and adds greatly to the ease and efficiency of its removal. After its removal, apply another small bead of the acid and work the broach upward until it cuts its way the entire length of the canal. This being accomplished, apply a saturated solution of soda bicarbonate on the same broach, working it well up to the apex, and continue it until all effervescence ceases. Next comes a thorough washing with hot sterilized water, as hot as can be used comfortably.

The canal is now clean and sterilized, and should be filled at once. There is no necessity for further treatment. Many operators, however, follow with an antiseptic before finally drying and filling, but personally I have sufficient faith in the sulfuric acid. If your conscience or timidity prompts a useless application, for heaven's sake do not resort to iodoform or creasote; let the medicament be a dainty one, that will not offend the nostrils or pollute the operating room. Chlorid of zinc will do all and everything that can possibly be expected of any of the vile preparations. Formalin, three per cent., is void of offense and equally effective.

I have been talking to you about a simple case. Now we come to canals having putrescent pulps, or pulps that have not been interfered with by the operator, but have from some cause died.

If the condition presented is simply a dead pulp that has been intercepted before inflammatory action has been established, proceed immediately to open the chamber thoroughly, then wash out gently with warm water to remove all *débris* left by bur or excavator, and proceed exactly as I have suggested in simple cases.

If inflammation has supervened, open the chamber carefully and as thoroughly as existing conditions will allow; then wash out with hot water (not warm) and pyrozone, equal parts. Repeat this operation several times; simply washing out will not answer,—it must be prolonged if you are working for results. Handle such teeth carefully, avoid introducing a broach to any depth in the canals. If inflammation has not progressed too far, this simple treatment will give immediate relief, and I need not remind you that the next step in treating cases of this kind is to dismiss the patient for twenty-four hours, and let nature have a chance. Be sure and apply rubber-dam at the second sitting, and let it be the first step before washing out with hot water and pyrozone; then apply sulfuric acid as before, and remove what remains of the pulp; continue the use of acid and broach until you have penetrated to the end of all canals. This may often require more time than you want to spend, but stick to it,—the end justifies the outlay. If you get discouraged, seal up the cavity after applying formalin, three per cent., and give another appointment, but don't forget to follow the acid with soda bicarbonate. Possibly in a very obstinate case you will require three sittings, but these are rare. After the inflammation has subsided there is no reason for further treatment, providing you have gotten the canals open and enlarged as you want them; the sooner the canals are filled, the better. But remember that before filling absolute dryness is essential, first with bibulous points to remove excess of moisture, then with hot air or broach. The drying to be effectual must be carried to the point of desiccation.

It seems superfluous for me to mention the well-known treatment for alveolar abscess with existing fistula, the prompt and permanent cure of which depends upon the thorough sterilization of the fistulous tract, with an agent both antiseptic and escharotic. This is readily accomplished by forcing through the root-canals carbolic acid or wood creasote, but in order to do this it is often necessary to enlarge the apical end of the canals, and here sulfuric acid is also indicated, for as an opener it has no equal. After treating a fistula, plug the apical opening and apply sulfuric acid, providing you have not used it in opening, and fill the canals at once.

The application of fifty per cent. sulfuric acid to the teeth may be considered harsh treatment by those who have never employed it, and indeed it is an agent which should be handled with care.

Its use should not be undertaken without the rubber-dam, and always associate with it soda bicarbonate.

In opening small and contracted canals, a small broach should be used, upon which a shred of cotton has been wound to aid in holding the acid. Celerity is necessary in introducing it, lest it destroy the cotton and the little bead of acid drop from the broach and leave a lasting mark should it overreach the rubber-dam. If sulfuric acid will not open a contracted canal, nothing but a drill will, and usually a drill will not.

A word about drying canals: Don't spend your time blowing hot air into a canal until you have first removed the surplus moisture with bibulous points, and I would advise you after employing hot air, hot broaches, etc., and are quite sure the canal is dry, to introduce a fine bibulous point as a test. It will often demonstrate to you that your efforts with heat have not been successful. Bear in mind that absolute dryness is essential to success, as I have said before,—dryness that is so dry that it sterilizes. I believe that if every medicament were taken from us, it would be possible to successfully treat pulp-canals with bibulous points and a red-hot copper broach alone.

This treatment which I have gathered and adopted is not original, neither is it the result of hasty observation drawn from journals, but is the result of careful reading and experiment, and based upon daily practice and founded upon common sense and a belief that it is sound and scientific. I am free to acknowledge that in twelve months I have had two failures, but these were due to the operator rather than the method. You know we are sometimes overcrowded and get to doing things hastily, and the temptation to come a little short of the apex gets the better of us, and we make failures just when we are within an infinitesimal distance of success.

Discussion.

Dr. W. A. WHITE, Phelps. There is, as the essayist says, much diversity of opinion about the best way to treat pulp-canals. Some use sulfuric acid, followed by bicarbonate of soda; others use carbolic acid, which is his method. The treatment must depend upon the existing conditions. In treating putrescent pulps he opens the canal thoroughly and injects pyrozone. This will, he feels, thoroughly destroy and carry out the putrescent matter. In filling root-canals there are many methods, but the one recently introduced by Dr. Weld, called the metallo-chemical method, seems to be worthy of serious consideration. Dr. F. H. Lee has a record of one hundred and fifty successful cases.

Dr. F. H. LEE said that each dentist should use the method which brought the best results, adapting treatment to the conditions present. He uses the Weld method in cases where there are putrescent pulps, because it enables him to dispose of the case at once. He had only had six cases which he had treated by the Weld method return for further treatment, and over one hundred and fifty which were disposed of in one treatment.

Dr. MACDOUGALL questioned whether the use of sulfuric acid is quite safe. It seemed that although the bicarbonate of soda was applied at once, it perhaps might not neutralize all of the sulfuric acid, and the free acid remaining possibly would destroy the dentin and cause trouble.

Dr. Burkhart said the danger in treating root-canals was the possibility of forcing putrescent matter through the apical foramen. This was always a danger which required the nicest care to avoid. He considered the paper a conservative one, and if the directions were carefully carried out would be useful to the profession.

Dr. Ames, Albany, said that treatment for one condition would not be applicable to a different condition. Take, for instance, a third molar, either upper or lower, with the distal wall entirely decayed away, and it would be entirely impracticable to put rubber-dam on and use the sulfuric acid as described. If the essayist had individualized the different classes of cases which come to every man's practice and described treatment for each, it would have been more interesting. In many cases all that is necessary is to flush the canals with water and then render them aseptic by the use of a proper germicide. Difficult cases he could not treat so simply as the paper teaches, and there are some operations which he cannot perform satisfactorily. He was opposed to the use of iodoform and other ill-smelling medicines, as he was sure there were pleasanter and quite as efficient substitutes.

Dr. J. B. Ernsmere, Buffalo, said when arsenic is used to devitalize a pulp and the patient returns a couple of days after with the tooth still sore and the treatment has to be repeated, there is danger that the cementum of the tooth will be killed, which will cause the tooth to be so troublesome that it will probably have to be extracted. He therefore thought it the part of wisdom to use a safer method. When the pulp-canal is filled, no matter how perfectly, there are fibrillæ of the dentin full of gelatinous matter, which may become infected with germs and cause trouble unless a very penetrating antiseptic is used in the canal, and some canals are so small and curved that it is quite impossible to fill them perfectly. He used iodoform in such cases, as he believes it gives good results in spite of the disagreeable odor.

Dr. A. M. Holmes, Morrisville, said that the paper covered the ground as far as the treatment of pulp-canals when the rubber-dam could be applied, but there are many cases where it was not applicable, or where it would be exceedingly troublesome and painful to apply. He had been using pellets of cotton soaked in campho-phenique. This can be prepared by heating carbolic acid and pouring it into a bottle with camphor-gum. It is an excellent remedy. The camphor neutralizes the carbolic acid so it will not hurt the gums. Prepare the pellets of cotton and soak them in the campho-phenique, then work in the canals as well as you can without the rubber-dam. When the saliva overtakes you, crowd one of the pellets in and take a rest. The cotton will keep out the moisture.

He thought there was nothing better than the nitrate of silver treatment for root-canals. It fills the dentin with the metal so that it can never develop any putrescence to make trouble.

Dr. DARBY asked Dr. White whether, after twenty years' treating pulp-canals with carbolic acid, he had got so that one treatment would invariably do the business.

Dr. WHITE replied that he had not.

Dr. DARBY said he thought it time that Dr. White should adopt a better method. He had never pursued the treatment of root-canals with success until he adopted the sulfuric acid treatment described in his paper about thirteen months ago, and he had had no failures since. The acid could not injure the tooth, as the immediate application of soda neutralizes it and makes it harmless. Dr. Ames spoke of the difficulty of access to pulp-canals. Of course there are in the practice of dentistry times when we meet impossibilities, and he was not speaking of such cases, but those where the rubber-dam can be applied. There is only one way to open a root-canal; that is, by the use of the engine bur. When you have followed the canal as far as possible you have got to take chances on the remaining portion, and the best thing to take chances on is the sulfuric acid. It will destroy any matter in the canal, or in the adjacent tubuli. If we can get into a pulp-canal with anything, we can carry the sulfuric acid in, and it will destroy and render aseptic whatever is in the canal, and the soda will wash out the acid.

When he used arsenic to devitalize a pulp, his practice was to leave it four days, and then he expected to find the pulp perfectly free. If it was not so, he would seal it up again. The sulfuric acid treatment was not original with him, but was introduced to the profession by Dr. Callahan some time ago, and he had taken it up as a good thing.

Sulfuric acid is classed as a mineral acid, and it destroys all animal tissues by dehydration on account of its strong affinity for water, and this is the principle we wish to profit by.

Discussion closed, and the convention adjourned until morning.

(To be continued.)

DENTAL SOCIETY ANNOUNCEMENTS.

NATIONAL DENTAL ASSOCIATION—SOUTHERN BRANCH.

THE Southern Branch of the National Dental Association, by invitation of the Louisiana State Dental Society, will hold its second annual meeting in New Orleans, La., February 9, 10, 11, and 13, 1899. The following day is Mardi Gras.

The date fixed for the meeting will enable the profession to participate in the carnival attractions, and also to secure the advantage of the reduced rates of transportation, which will be one fare for the round trip.

The hotels have made a special and very liberal rate for dentists and their families.

Parties deciding to attend would do well to send in their names at once to

Dr. J. Rollo Knapp, 620 Canal street, New Orleans, La., chairman of hotel and quarters committee, or Dr. C. L. Alexander, corresponding secretary S. B. N. D. A., 8 South Tryon street, Charlotte, N. C.

The following is a list of the hotels and boarding houses the visiting members may find convenient and desirable while attending the meeting. It will be necessary to notify Dr. J. R. Knapp in advance to secure good rooms, any information concerning which will be carefully furnished by Dr. J. Rollo Knapp, 620 Canal street, New Orleans, La., chairman hotel and quarters committee, or Dr. Wallace Wood, Jr., 625 Canal street, secretary of the executive committee, Louisiana State Dental Society.

Hotels.

St. Charles Hotel, American plan, $4.00 a day and up according to location of room; European plan, $2.50 and upwards.

Hotel Royal (French quarter), American or European plan, $2.50 to $4.00 per day according to location of room.

Cosmopolitan Hotel, European plan, from $1.50 upward.

Antoines Hotel (French) Nos. 713 to 717 St. Louis street, $2.00 and $3.00.

Hotel Denechaud, American or European plan, from $2.00 to $3.50 a day.

Metropole Hotel, American plan, $2.00 per day.

Rooms.

Fabacher's Hotel, 50 cents to $1.00 per day.

Penn's Hotel, 50 cents to $1.00 per day.

Commercial Hotel, $1.00 to $2.00 per day.

Metropole Hotel, 50 cents to $1.00 per day.

Rooms (French), Nos. 234, 237, 239 Bourbon street, from $1.00 to $3.00.

Private Families.

Mrs. Hawze, No. 1350 Magazine street, rooms with board $1.00 to $2.00 per day; special rates by the week or month.

Mrs. Joseph B. Davis, No. 1710 Prytania street.

Mrs. C. R. Van Wick, No. 1819 Annunciation street.

Miss Lulu Bailey, No. 846 Camp street.

For railroad rates use the Mardi Gras tickets, which will give the *round trip for a single fare,* and will be put on sale on February 6 or 7. Those living beyond territory covered by the Mardi Gras rate privilege should apply several days in advance to their local agent, and secure a certificate which will enable them to return for a one-third fare, provided their road has made this concession for the occasion.

WASHINGTON CITY DENTAL SOCIETY.

AT the last and thirty-second annual meeting of the Washington City Dental Society the name was unanimously changed to The District of Columbia Dental Society, and the following officers elected to serve the ensuing year: Dr. Charles W. Appler, president; Dr. Robert M. Talbott, vice-president; Dr. H. Jerome Allen, secretary; Dr. Mark F. Finley, treasurer; Dr. Henry B. Noble, librarian; Dr. William A. Lyon, essayist.

H. JEROME ALLEN, *Secretary,*
421 H st., N. E., Washington, D. C.

THIRTEENTH INTERNATIONAL MEDICAL CONGRESS.

The thirteenth International Medical Congress will be held in Paris, beginning on the 2d of August and continuing until August 9, 1900.

The Committee on Organization has provided for a Section of Stomatology, in which all foreign and French doctors practicing stomatology will be entitled to membership.

The Organizing Committee of the Section has elected the following officers:

Dr. Pietkiewicz, president; Drs. Cruet and Gaillard, vice-presidents; Dr. Ferrier, secretary-general; Dr. Rodier, treasurer; Drs. Chompret and Gires, secretaries.

All communications in reference to that Section should be addressed to

DR. FERRIER,
39 Rue Boissy d'Anglas, Paris.

PENNSYLVANIA BOARD OF DENTAL EXAMINERS.

EXAMINATION of applicants for license to practice dentistry in Pennsylvania will be held April 11, 12, 13, and 14, 1899, in Philadelphia and Pittsburg, and June 13, 14, 15, and 16 in Philadelphia only.

Application to the Dental Council, Harrisburg, for blanks for the next examination should state in which city the applicant desires examination.

G. W. KLUMP, *Secretary.*

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EDITORIAL.

THE APPOINTMENT OF DENTAL SURGEONS IN THE ARMY AND NAVY SERVICE OF THE UNITED STATES.

ON various occasions the need and importance of supplying to those engaged in the military and naval defensive work of our country an efficient dental service has been agitated, and sporadic and spasmodic efforts have been instituted with that object.

One of the standing committees of the World's Columbian Dental Congress in 1893 was appointed for the purpose of "promoting the appointment of dentists in the armies and navies of the world." That committee included representatives from England, Germany, Holland, Switzerland, Italy, Denmark, Russia, Nova Scotia, two South American republics, and four from the United States, thus giving a wide national scope to its field of labors.

At the meeting of the Congress of 1893, the chairman reported that "the opposition to such appointments was from the surgeons in the army and navy of the United States. The proposition of giving the dental surgeon an equal grade with the surgeon met with the strongest opposition." It was deemed the better course "not to be too urgent at this time, but to send every year a copy of this request to the Surgeon-General, to remind him that the efforts to place the dental surgeon on an equal grade with the surgeon had not been abandoned."

It is to be noted that the demand of the Committee No. 20 of the World's Columbian Dental Congress contemplated the placing of the dental surgeon in the service of the United States on the same grade as the surgeon, and presumably this feature was included in their demand. The report does not, however, state anything as to the qualifications which it was proposed to offer in order to give reasonableness and equity to the demand made, and this feature appears to us to be the crux of the whole matter. No one conversant with the facts doubts for a moment the great need for competent dental service in the military and naval branches of our government, nor does any one doubt the absolute inefficiency of the general military surgeon to treat dental and oral diseases. This phase of the question is ably presented by Assistant Hospital Steward Murray Acklin, of Jefferson Barracks, Mo., in an article published in this journal for June, 1897. Information privately received and entirely unsolicited from surgeons enlisted in the recent Spanish-American war tends to corroborate the views set forth by Mr. Acklin, and to emphasize the fact that the dental care of our soldiers and seamen is a need which is a pressing and important one, and one which, on humanitarian grounds, should be provided for by our government.

A renewed impetus has been given to the movement toward solving this problem by the introduction, on December 7, 1898, of a bill in the National House of Representatives by Mr. Hull and designated H. R. 11022, "For the reorganization of the Army of the United States and for other purposes." Sec. 11 provides for the appointment of "one hundred dentists, with rank, pay, and allowances of a first lieutenant mounted, who shall be graduates of a dental college and shall pass a satisfactory professional examination." The bill does not, however, provide for promotion or increase of pay, etc., as is provided in the case of surgeons, nor is any higher grade for the dentist created as in the case of surgeons. Undoubtedly, then, if the Hull bill in its present form becomes law, a definite and invidious distinction as to grade between the surgeon and dentist will become permanently fixed in the service, with a retinue of contingent unpleasantness and possible indignity almost certain to ensue in a military environment.

The situation is therefore one which should receive the careful attention of all thinking members of our profession, and especially of those who believe it is worthy of a higher status and are willing to enlist their efforts toward attaining it.

At the recent annual meeting of the National Dental Association at Omaha a committee, with Dr. Williams Donnally, of Washington, as chairman, was intrusted with the work of securing as favorable an alteration of the Hull bill as might be possible under existing conditions, with a view to giving our profession its proper status with respect to these proposed dental appointments. The committee apparently realize what seems to be clearly the fact, that if we are to attain practical recognition by the government of our right to a status which shall be equal in grade to that of surgeon, we can only hope to attain the coveted recognition by offering a standard of professional qualification fully the equal of that offered by the surgeon; and as professional qualification is tested by examination, the examinations for the post of surgeon and of dentist should be at least equivalent if not identical.

Under the circumstances outlined,—*i.e.*, by offering an equivalent standard of qualification,—we would be in a position to make the further demand of adequate provision for promotion to higher grades, and as a prerequisite thereto secure the creation of higher grades to make such promotion practically possible. As an effort toward the ends noted, the committee have prepared the following substitute for the clause of H. R. bill 11022 relating to appointment of dentists in the army:

> "One dental surgeon with rank of colonel, one dental surgeon with rank of lieutenant-colonel, two dental surgeons with rank of major, sixteen dental surgeons with the rank of captain mounted, and seventy-three dental surgeons with the rank of first lieutenant mounted, with right of promotion in the grades named under the rules applicable to the corresponding grades of surgeons and assistant surgeons, all of whom shall be graduates of medical or dental colleges and shall pass a satisfactory professional examination. Provided that dental surgeons appointed as here provided may be transferred to the grade of assistant surgeon by complying with the examination requirements of that grade; and provided further that for all vacancies otherwise occurring in the number of dental surgeons herein provided for there shall be appointed a corresponding number of assistant surgeons, who shall first pass satisfactorily both the examination requirements of that grade and an examination in the special subjects of dental and oral surgery."

The whole question of dental surgeons in the military service is now prominently before the law-making power of this country, and it is of the utmost importance that whatever may be done in securing the desired end shall be well done. We should first of all see to it that a status is accorded us in harmony with our rights in the premises, and no selfish desire for the immediate success of our object should be permitted to defeat our success in attaining this recognition on a proper plane.

The class of practitioners who for the sake of the position and its limited emoluments would be willing to sacrifice professional dignity by taking rank below what is a fair professional status should not be permitted to interfere in so important a matter.

All suggestions or criticisms should be sent to the committee for their guidance and action, and their hands should be upheld in this important movement by the whole profession as the need may arise for such help. Above all, there should be no outside interference even in the shape of well-meant attempts at aid, as one misguided effort of that character might readily defeat the whole enterprise.

NEW YORK ODONTOLOGICAL SOCIETY.

The thirty-first anniversary meeting of the New York Odontological Society, held January 17, was a noteworthy occasion. As announced in the November issue of this journal, two papers by Dr. J. Leon Williams, of London, Eng., were presented, one at the afternoon meeting, entitled "A Contribution to the Bacteriology of the Human Mouth," and another at the evening meeting, entitled "Which Shall it Be, the Empirical or the Scientific Method?" The unavoidable absence of the author by reason of ill health necessarily detracted much from the fullness of the presentation, but the intrinsic interest of his diverse topics and their masterly treatment furnished a rare treat to those who were fortunate enough to be in attendance. The bacteriological research reported in the first paper is in continuation of the work already reported in this journal, beginning in the March issue for 1897, and embodies a discovery with reference to the reproductive processes of certain forms of Leptothrix which is almost revolutionary in character.

His second paper deals with a topic which is at the foundation of dental professional progress, and is such a putting of the problem as must lead ultimately to an entire change of base with respect to some of our present methods.

We propose to furnish our readers with a goodly share of this exhibit in our March issue.

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Transactions of the California State Dental Association, twenty-seventh Annual Session, 1898.

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OBITUARY.

DR. S. L. EDWARDS.

DR. SURRY L. EDWARDS died November 12, 1898, at his home in Des Moines, Iowa.

Dr. Edwards had been ailing for several months, but was confined to the house only two weeks. He was seventy-one years of age last March, was born in Gilford, Vt., and had lived in Des Moines since 1874. He leaves several sons, the eldest, Horace N., being associated with him in practice.

Dr. Edwards entered the McKendree college in 1847, and graduated. He taught public schools for five years, and then began the study of dentistry, entering the practice of that profession in Griggsville, where he was married in 1855 to Emma A. Dickinson. Dr. Edwards was a member and an officer of the First Methodist Episcopal Church for many years. He assisted in the formation of the church, and had ever been an active, conscientious worker for its upbuilding. Although a man of retiring disposition, and one who took no part in public affairs, he was always a close observer of the progress of the city and of all things looking to a betterment of society.

DR. LORENZO D. WALTER.

DR. WALTER died of old age at Rochester, N. Y., November 16, 1898. He was born at Little Lake, N. Y., March 19, 1813. About 1840 he began the study of dentistry with Dr. D. S. Kellog, of Fort Plains, N. Y., and at the termination of his period of pupilage entered upon practice in that town.

He had the degree D.D.S. conferred upon him honorarily by the University of Cincinnati, Ohio.

He was a member of the Seventh District Dental Society of New York, and an honorary member of the Sixth District Society of the same state, also of the Rochester City Dental Society.

He was married to Sophia Etheridge, of Utica, N. Y., now deceased. No direct issue resulted from the union, an adopted daughter being the only survivor.

DR. GEORGE MACNALLY.

Died, at Buenos Aires, Argentina, S. A., June 22, 1898, George MacNally, D.D.S., aged thirty-eight years.

He graduated from New York College of Dentistry in 1889. Going thereafter to Argentina, he passed the stringent examination of the Medical Board of Buenos Aires October 10, 1891, and entered upon the practice of his profession in that city.

Dr. MacNally quickly won his way into popular esteem not only as a skilled practitioner, but especially because of his attractive personality. He had the respect of all who knew him, and his untimely death created a widely-felt loss in the community he so ably served.

DR. JAMES C. GREER.

Dr. James C. Greer died at Marietta, Ga., November 25, 1898, of heart-failure, after a severe attack of pneumonia.

Dr. Greer was born May 27, 1838. When about twenty-one years of age he began the study of dentistry. He enlisted in the Confederate army in 1861, and served during the war, being present at the surrender at Appomattox Court-House, Va., in 1865. He began the practice of dentistry in 1866. After a few years' practice, he took a course of lectures in the Medical College of Atlanta, Ga., in 1872 and 1873. He graduated as a dentist from the Pennsylvania College in 1878.

Dr. Greer returned to Marietta and resumed the practice of his profession, which he continued till his death. He made an enviable reputation, which extended to different states; his genial and pleasant manners made him a great favorite. His charitable instincts were strong, and he will be greatly missed both in his church relationship and by his community.

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PERISCOPE.

On Cement.—Who among you, when he tries a new cement for the first time, but breathes the silent wish, "May I at last have found a cement that will not prove to be an illusion!" and who among you can say that his wish was ever fulfilled?

It is my belief that cement gives us more trouble than any other filling-material. No other substance provides us with so many surprises, and they are rarely of a pleasant sort. It is one of these rare surprises that furnishes the occasion for my bringing this subject to your attention to-night.

Early in the present year a patient came to my office, for whom I had made a Rostaing cement-filling on the 2d of March, 1885, all the teeth but two molars having disappeared from the upper maxilla. To my surprise I found the filling in perfect condition.

As my experience with cement had for years been only a source of annoyance, this discovery made a deep impression upon me, and I could not help reflecting that Rostaing's merit, great as it is, can never atone for his negligence in carrying his secret with him to the grave.

Although I had made innumerable attempts to prepare a cement myself, and each attempt had brought fresh disappointment, this discovery inspired me with new courage and I determined to take up the cement problem once more.

After a careful study of all the available literature on the subject, I have come to the conclusion that the various authors may be divided into two classes.

1. Those who know how to prepare a cement, but systematically keep the process secret, and merely publish experiments on shrinkage, expansion, solubility, and resistance to physical and chemical agents, for the purpose of advertising the article they have put on the market by a quasi-scientific discussion of its merits; and

2. Those who, no doubt with the best intention of benefiting their colleagues, give detailed descriptions of various methods of preparing cement, but evidently take their information at second hand, for I have never been able to produce a cement by following their directions. My want of success in this line has convinced me that these authors have been misled by the wholly or partially false statements of men who find it more to their advantage to keep the correct mode of preparation secret.

My greatest stumbling-block was the aphorism, unanimously accepted even by the highest authorities, that "the powder consists principally of zinc oxid."

Zinc oxid is the powder obtained by washing, drying, and calcining the precipitate formed by combining warm solutions of zinc sulfate and sodium carbonate. But any one who thinks he can prepare zinc phosphate cement with this powder, as some authors claim, will be likely to waste a great deal of time and energy in fruitless experiments. Such at least was my fate, and but for a communication by Mosman in the *Archives of Dentistry*, which furnished me a valuable hint, I should most likely have abandoned my experiments. Here I found a confirmation of a discovery I had made myself, that pure officinal zinc oxid will not mix with phosphoric acid.

Instead, take equal parts of pure oxid of zinc and pure nitric acid, mix them in a crucible and subject the mass to great heat, until it assumes a light yellow appearance. The decomposition products of the nitrate escape as brownish fumes. I continued to heat the mixture until a small piece of moist blue litmus-paper, held over the crucible, failed to show an acid reaction, and I was convinced that none of the zinc nitrate had escaped the decomposing action of the fire. After the mass had cooled it was carefully pulverized and sifted. I need hardly tell you how grateful I felt when I found that this powder, mixed with phosphoric acid, produced a hard piece of cement.

Up to this time I had been accustomed to lay aside my little samples at night with what feelings of hopefulness I could command, saying to myself, "Surely to-morrow morning they will be as hard as stone," only to suffer the disappointment of finding them stickier than ever the next morning. But this first success restored my spirits, and with renewed courage I proceeded to experiment with every variety of combination. I tried orthophosphoric acid. But the oxid of zinc obtained from the nitrate still possessed certain objectionable features. The zinc phosphate cement on section failed to show the desired hardness and retained its acid taste too long when placed in the mouth; besides, it did not stick to the glass on which I mixed the cement as firmly as I could have wished.

My first improvement consisted in substituting pure zinc for the oxid. I dissolved the metal in pure nitric acid, and, after evaporating the solution to dryness, I heated the crystalline residue until the nitrate of zinc was completely decomposed. I was now certain that the oxid, obtained in this way, had once consisted entirely of zinc nitrate. This ZnO had a much higher specific gravity than the officinal oxid.

The cement prepared with this powder proved to have a higher resisting power, but the troublesome acid reaction still remained. To recount to you all the various combinations I tried, in order to get rid of this objectionable feature, would be superfluous. I shall simply state that I finally hit upon a zinc oxid which brought me success. In addition to the zinc oxid obtained by precipitation there is one obtained by sublimation, and it was this latter form which brought about the greatest improvement in my preparation.

By adding a quantity of sublimated zinc oxid to the oxid obtained from zinc nitrate and mixing the powder with phosphoric acid, I had the satisfaction of getting a cement which, to all appearances, possesses the following properties:

1. It adheres firmly to the walls (of the tooth), for it sticks fast to the glass on which it is mixed.
2. It offers great resistance to mechanical agencies, for it is hard without being brittle.
3. It is comparatively insoluble, for the acid reaction ceases to be perceived by the tongue after a very short time.

I need hardly tell you that once this point in the investigation has been reached, a hundred ways are open for further experimentation. Instead of orthophosphoric acid $3ZnO + 2H_3PO_4 = Zn_3(PO_4)_2 + 3H_2O$, meta- or pyrophosphoric acid, or any combination of the three acids, may be tried.

A small quantity of zinc oxid may first be dissolved in the warm acid; basic or neutral phosphate of zinc may be mixed with the powder, or pulverized glass or porcelain added to it.

But an exhaustive investigation of the relative merits of all these various combinations requires the co-operation of many experimenters, for a lifetime would not suffice for one man to determine their behavior in the mouth. The experiments of Richter and Hoffmann to determine the shrinkage, expansion, and solubility by means of glass rings immersed in lactic acid; those of Daurillé to ascertain the solubility in hydrochloric, acetic, and lactic acid; and the attempts of other investigators to demonstrate the presence of an acid reaction in the floor of a cavity made in ivory have all met with merited approbation, but they all lack one important factor which cannot be reproduced artificially,—the influence of vital processes.

As I attach no value to experiments unless made in the living mouth, my conclusion is that the researches must be carried on by practicing dentists. Only those who daily experience the annoyance of a soluble cement can ever provide the profession with an ideal filling-material, and it is therefore the duty of every dentist who has not forgotten all the chemistry he ever knew to continue the work of experimentation.

If those who daily have the opportunity of observing the behavior of cement in the mouth will devote themselves to the task, there is a chance of a more trustworthy cement being discovered than any article prepared by men outside of the profession.

I also wish to point out and emphasize the importance of practical experience in laboratory work and the danger of leaving any part of the work to assistants. Nitrate of zinc is a moderately poisonous compound, and unless proper care is taken to expel all the nitrate by heating, the cement filling, besides dissolving after a short sojourn in the mouth, is apt to produce zinc poisoning.

If the mechanical part of the work is intrusted to an assistant it may happen, for instance, that he neglects to clean the sieve before using it for a new experiment, and the zinc oxid remaining from the previous lot, which has become converted into zinc carbonate, will ruin the new preparation. so that, instead of a hard cement, a mass is obtained which is more like zwieback than cement.

For my part, I suspect that most of the manufacturers who at first turn out a good article eventually leave the preparation of the cement to their workmen, and that this is the chief cause of all our disappointments.

Rostaing himself would probably have pursued this course if he had lived, and his untimely death is no doubt partly responsible for the unrivaled excellence of his cement.

I indulge the hope that my words will touch a responsive chord, and that our united efforts will soon discover the cement which shall make us independent of the preparations of outsiders.—*Dr. E. Stark, Amsterdam, Holland, in Deutsche Monatsschrift für Zahnheilkunde.*

Paralysis Cured by the Extraction of a Tooth.—Mühl-Kühner (*Munch. med. Woch.*, 1898, p. 951), dentist, reports the following case: A young woman, twenty-four years old, had been suffering with paralysis of the right arm and the right side of the neck for two and a half years.

This paralysis was thought to be the result of a fall, in which her right arm was fractured. When in spite of proper treatment there was no improvement, an operation was advised. As she had some trouble with her teeth, she applied to the writer for treatment. He filled several teeth, and the upper right third molar, being deeply carious, was extracted. On the following day the patient came to the author, declaring with joy that the paralysis had disappeared and that she was able to move the former paralyzed parts with perfect freedom. (A similar case was reported by Dr. Semmell in the *Corr. Bl. f. Zahnärzte*, April, 1898, p. 189.)—*American Med.-Surg. Bulletin.*

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HINTS, QUERIES, AND COMMENTS.

To the Editor of the Dental Cosmos:

Sir,—When I read in the August Cosmos, of 1898, Dr. Ottolengui's query, "How would you make an exact duplicate of a full denture in the absence of the patient?" and the accompanying answers, I was disappointed, because all the writers confined their replies to vulcanite dentures. I believe that it would have been instructive to many of the rank and file of the profession if at least one of them had given his method of duplicating a vulcanite denture with a metallic base.

Since none of them did so, I will describe as briefly as possible the method by which I do such work. To transfer the crowns from a vulcanite plate to a metallic base without taking an impression of the mouth and yet secure all the essential features of a duplicate denture, proceed as follows: Cleanse the plate and invest its lingual surface in plaster, and build up a rim around it about half an inch above the edge of the rubber. Let this rim flare a little toward the top. Trim it level, and place on it an iron band half an inch wide and of suitable shape. Unite the band to the plaster rim with plaster. Place this in such a position that the top of the band will be level, and pour into it an alloy made of bismuth 8, tin 3, lead 5, and antimony 2, called Hodgen's Die Metal, or an alloy made of bismuth 48, cadmium 13, and tin 19. I use the latter formula. Whatever alloy is used must melt as low as 212° F. Let the alloy rise perceptibly above the margin of the band. Chill and separate. Then take a vulcanite flask with the band, and fill it to within one-fourth of an inch of the top with modelling compound. Immerse this in boiling water till it is soft, and press the die into it down to the lower edge of the band. Chill and separate. With this die and counter proceed to swage gold or aluminum. For the case in hand we will take aluminum, 18 or 20 gauge. Anneal the plate by holding it in a Bunsen burner for thirty seconds before shaping it to the die with the mallet. The annealing must be repeated as often during the swaging process as may be necessary to keep the plate in working condition, taking care always to cleanse the plate of all adherent particles of die-metal before annealing. It is well to place a piece of rubber-dam between the plate and the die while shaping with the mallet, to prevent the unnecessary bruising of the surface of the metal. Having shaped the plate approximately with the mallet and trimmed the edge, swage lightly at first, and as wrinkles form in the margin smooth them out with the mallet, renewing the counter as often as it is necessary. As the work progresses, heavier blows may be employed until the work is completed. An aluminum plate is easily swaged with one die and three or four counters made of modelling compound.

Set the crowns half their length in plaster, and attach to the lower half of an articulator. Pour plaster into the palatal portion of the denture cast, and attach to the upper half of the articulator. Open the articulator, and remove the plate from the cast. Remove the crowns from the vulcanite, and put them in their respective places. Having placed the plate on the die and spurred it, put it on the cast and close the articulator. If the crowns interfere with the plate, grind their upper ends till they do not interfere. With a minim drop-tube flow water about the crowns till the plaster is wet, and then with wax and a hot spatula carefully unite the upper ends of the crowns without lifting them from their positions in the plaster. Place a layer of wax on the spurred portion of the plate, warm the wax, and close the articulator. With a hot spatula unite all the crowns firmly to the plate, keeping the plaster wet so that the wax will not adhere to it. Open the articulator and finish waxing up preparatory to flasking.

WOODLAND, CAL., Dec. 31, 1898. A. N. DICK.

A MODIFICATION OF DR. CHRISTENSEN'S HALF-CAP CROWN.—There was published in the DENTAL COSMOS for December, 1898, a most excellent paper, written by Dr. Christensen, describing what he calls a half-cap crown. Most of us I think, who have read the paper, will agree that this crown has all the advantages of the original Richmond minus many of its disadvantages, but it still possesses one of its worst, namely, liability to fracture of the porcelain. This of course may be greatly reduced by bringing the backing down over the cutting-edge of the tooth, but the appearance of it in many mouths is very unsightly and at once proclaims its artificiality. I should like to suggest a modification of Dr. Christensen's method, which in my opinion gives us one of the most perfect crowns within reach of the dentist.

Dr. Christensen says in his paper, "The weak points of the Logan crown restoration lie chiefly in the root. . . . As there is no band to encircle the root, the pivot then works as a lever, by a normal bite acting from the center upon the buccal half of the root, resulting sooner or later in splitting the root." This may be stating the case rather strongly, for the result of my observations seems to be that it is practically always "later" rather than "sooner," and often not at all, that this happens, but it is right in theory and happens much too often. There is, however, no reason why there should not be a "band to encircle the root," or, as there are certain objections to that, there is nothing to prevent us using the half-cap which Dr. Christensen has described so fully.

It seems as though a combination of these two, the half-cap and Logan crown, could hardly be improved upon. The Logan is acknowledged by almost every one to excel in naturalness of appearance, besides being much stronger of itself than any other, and the Richmond is said to be the best crown for root preservation and strength of attachment. What can we wish more than a combination of all these points? Of course we may occasionally come upon a case where the bite is so long that it would be impossible to use a Logan crown, and we would have to resort to the Richmond, but in the vast majority of cases the application of a Logan is perfectly feasible.

The cap may be made in practically the same way as for the half-cap

Richmond as described by Dr. Christensen, except that it is better to use a temporary post at first, which must not be soldered to the floor of the cap. This floor is extended just beyond the root-canal, and a hole punched in it at the proper place just a little smaller than the post of the Logan crown to be used. Grind the Logan to place on the tooth, allowing space at the proper place for the half-cap, then place the half-cap on the root and force the Logan to place. The hole in the floor of the cap having been made a little smaller than the post of the crown, when it is forced into place the friction will hold the cap in its proper relation to the crown, and it may be at once cemented to place without soldering, although if deemed desirable it may be done by investing and securing with a very small piece of solder on the inside of the cap. If the relation between the crown and cap is not perfect, it may be remedied by using a thin layer of gutta-percha between the two.—EDWARD E. HENRY, D.M.D.

BREAKAGE IN SOLDERING.—In a recent article in the *Dental Review* a practitioner of local repute says, "Crown- and bridge-work are my food and drink," and as a finality in regard to breakage in soldering, "Some breakages come from backings being so positioned as to put a strain on porcelain in cooling. I think most breakages come from allowing the porcelain facings to touch, and that from expansion the facings are cracked."

From a dietary standpoint that may be good, but for a scientific or practical statement of existing facts it is wrong.

There is one thing, and one thing only, that causes breakage in soldering, and that is moisture from the partially dried cast or investment striking the heated tooth, either by the too-rapid drying over the gas stove, or putting the blow-pipe flame upon the backing before the investment is dry.

Any housekeeper will tell you that when a stream of boiling water strikes a dry dish—porcelain or glass—there is but one result, fracture. Why? These two substances being poor conductors of heat, the molecules are unable to bear the burden thrust upon them, and make the change by expansion that is a sequence to their temperature being raised to the same degree as the boiling water, and give way under the strain. Thoroughly wet the dish with cold water, and matters are different. Any amount of boiling water can be poured with the utmost safety upon the most fragile cut glass or Sevres ware. The reason is that the wet surfaces of the ware permit the rapid and equitable transmission of heat throughout the whole body by the conductivity of the moisture upon its surface.

Porcelain facings in soldering require as much intelligence in handling as does a glass goblet or porcelain dish in washing. A dentist who invests a crown or bridge, and as soon as the investment is hard enough to handle places it over the gas stove and puts on a full blast of heat, can feel himself one of the chosen few if he does not always have a broken facing.

The contraction of platinum being more rapid than porcelain in cooling, requires only one consideration in soldering, and that is that the flame leave the point upon the incisive edge where the platinum laps. This insures equitable cooling throughout the tooth, and does away with those minute fractures so often seen upon the incisive portion of the incisors and cuspids when backed with platinum, and so rarely seen in the same teeth backed with gold.

Dry the investment slowly until all traces of moisture are driven off, then increase the heat until the investment is as hot as it is possible for it to get over the gas heater, transfer to an asbestos block, solder, and cover with another asbestos block, and leave until cold.

The higher the grade of teeth used the more likelihood of fracture when improper methods are employed, but proper observance of the method of procedure as heretofore set forth will insure absolute success in every instance, and the satisfaction of feeling that the dangers of subsequent breakage after final insertion in the mouth are reduced to a minimum by the use of high-grade teeth will more than compensate the practitioner for the time consumed in the observance of these rules of detail.—DANIEL FREMONT McGRAW, San Jose, Cal.

TO THE EDITOR OF THE DENTAL COSMOS:

Sir,—In the DENTAL COSMOS for December, 1898, page 1021, is a "cut" showing an irregularity which the sender, Dr. Henriquez, wishes advice about. I am not an authority on these things, but I inclose a picture of a case that I treated for a young man about nineteen years old something like forty years ago, and in so simple a way that I would like to have Dr. H. try the method.

The lower teeth touched the upper gum just in the way that your illustrations show. I made a metal plate for the upper, passing over the bicuspids and molars, on the outside well up on the gums, opposite the space between the molars. I soldered lugs to which I tied rubber rings cut from black tubing, made two flat pot hooks to rest on the cutting-edge of the centrals to prevent the silk thread, which I passed through the rubber rings and brought back and tied near the front of the mouth, from going up too high and cutting into the soft parts. This was worn constantly, could be taken off and cleaned and put back by any intelligent person. Once a week or less I put new rings on, and new thread. In due time the palatal face of the incisors interfered with the closing of the lower, but I only kept on larger rings, the result being that the lower teeth acted as a fulcrum, and the upper incisor roots began to move outward, and the depression of the lip under the nose filled up or out and we had a fine-looking young man in less than three months. There is, to my mind, nothing so very difficult in this case,—lots of room and youth. Let the doctor go ahead on the same lines. By making the contour of his plate on the lines that he would like to have his upper teeth be, he will have as easy a thing as he could wish. I have always been sorry that I did not get photo of the case before and after, but I was young then, and did not think I was an acute or any other sort of an angle, and only doing common things. J. N. BAZIN.

MONTREAL, December 13, 1898.

[The photograph accompanying the foregoing communication was not sufficiently clear for reproduction by half-tone process, but represented a case in all respects analogous to that submitted by Dr. Henriquez to the First District Dental Society of New York, as reported in this journal for December, 1898.—ED. DENTAL COSMOS.]

REPLACING COUNTERSUNK TEETH.—I think I have been quite successful in replacing countersunk teeth by the following method: Drill a hole through the plate nearly as large as the tooth, countersink well, wax in the tooth, then invest so as to pack from palatal side. The plate is not materially weakened and does not show repairs. Any loss of rubber can be supplied.—W. B. KELLY, Towanda, Pa.

A MONTHLY BIBLIOGRAPHY OF DENTAL LITERATURE.

COMPILED BY J. MELVIN LAMB, M.D., D.D.S., WASHINGTON, D. C.

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LIST OF UNITED STATES PATENTS

PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING DECEMBER, 1898.

December *6.*—No. 615,316, to JOHN F. SNEDAKER. Handpiece and frame for dental saws.
" " No. 615,404, to JOHN S. NAULDER. Dental plate.
" " No. 615,405, to JOHN S. NAULDER. Dental plate.
" *13.*—No. 615,808, to ARTHUR S. COOPER. Adjustable dental rubber-dam clamp.
" " No. 615,937, to MARSHALL G. WHEELER. Small scale.
" " No. 615,960, to HERMAN DOCK. Blowpipe.
" *20.*—No. 616,302, to GEORGE EVANS. Post and disk attachment for artificial tooth-crowns.
" *27.*—No. 616,666, to THEODORE S. HEINEKEN. Artificial tooth.
" " No. 616,815, to MAX TRESENREITER. Attaching tooth-crowns.
" " No. 29,876, to ALLEN W. SMITH and HENRY McDOWELL. Cap for teeth. (Design.)

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ORIGINAL COMMUNICATIONS.

WHICH SHALL IT BE, THE EMPIRICAL OR THE SCIENTIFIC METHOD?

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(Read before the New York Odontological Society, January 17, 1899.)

I THINK most men would not regard my position to-night an enviable one. The path of the reformer, at least at the outset, does not generally lead him through flowery meadows or by babbling waters. His way more frequently lies across arid deserts or the tempestuous ocean. His position is altogether the opposite of that of the opportunist, the man who is, at best, never anything more than the harbor pilot of the ship of progress. When the captain has navigated his vessel successfully through the howling winds and buffeting waters of a long voyage and brought her within sight of land, the opportunist pilot, who has been lying in wait for him just off the green and sheltered shore, steps on board, takes command, and, without hardship or danger, rides the ship into her haven on the top of the wave with all flags flying.

The task I have set myself to-night is that of initiating a work which is in the nature of reform. When I was with you two years ago some of the leading spirits of this society entertained me, after the manner of a very hospitable custom which they have on such occasions, at a dinner at the Lotus Club. And although in accepting this hospitality I expressly requested that there should be no speech-making to mar the dreams of our lotus-eating, there *was* a little speech-making, in which I was forced to take a small part; and when, in response to my advocacy of more encouragement being given to original research work, I was asked to make some practical suggestion, I said I would think the matter over. Well, I have brooded over this subject during the two years that have passed since I was here. I soon discovered that there were grave difficulties in the way of bringing about the work I so much desired to see done. Before a man or a body of men can be induced to take forward steps, the need for taking those steps must be clearly pointed out. The first thing which becomes necessary in the effort to induce the dental profession in America to take higher scientific ground is to point out that its present position is not scientific, or less so than it should be. And the only possible way of doing this is to examine and analyze the utterances of its leaders, teachers, and influential members. You begin to see the difficulties now of my task. At the very outset I must take the risk of alienating the very men whose support I most need. But this is a position which every one engaged in work of this character has to face, and there is no dodging it.

I should, of course, be very glad if it could be believed that back of all I have to say to-night there is but one feeling, one desire, and that is for progress in our profession. If I sometimes use strong expressions, it is because I know that namby-pamby methods never succeed in movements of this kind. The man who would influence his fellows in any work of reform must hold the situation in a firm grip, and chiefly consider the end in view. I have been told that in taking my present position I have probably overestimated the ideals of a great majority of the individuals composing our profession. But I have long observed that the man who sternly sets his face against playing to the pit and the gallery, and aims his efforts at the best intelligence in his audience, generally wins in the long run. And so I am not overmuch concerned whether or not there is an immediate response to my appeal, for I know that it will come; if not to-morrow or the next day, then after many days. If I could know that every student in our dental colleges would read this paper, I should be content. Their minds are free from prejudice and fixed habits of thought, and full of hope and enthusiasm, and that is the kind of soil in which to sow the seeds of progress.

One of the most delightful and original sayings of our dear friend and teacher, the late Dr. W. H. Atkinson, was, "There are many fools in the world, but the biggest is the one who says 'it cannot be.'" And he was right. *Anything can be* that has the support of twelve or even six earnest men who have once had a glimpse of the cosmic forces at work, and who have faith in themselves. They could move the world, for, unlike Archimedes, they have found a fulcrum for their lever. It would be highly gratifying to me if those six wise and earnest men could be found in this society. The influence of this organization is world-wide, and it contains men with sufficient executive ability to carry this or almost any other movement, into which they would put their whole hearts, to a successful issue.

With these introductory words I come directly to the subject in hand.

After the manner of the good, old-fashioned New England preacher, under whose ministrations I sat as a boy, I have selected two texts for my discourse this evening. The first is from an essay on Copernicus, by Edward S. Holden, and reads as follows:

"It is the merit of Copernicus that he reversed the ancient process of thought and inquired what hypothesis would fit observed facts, and not what additions must be made to an a priori *assumption to represent observations."*

My second text is from the writings of a man so great that he has been complimented by the conjecture that he was the real author of the works attributed to Shakespeare. The words I have selected are these:

"Now, among all the benefits that could be conferred upon mankind, I found none so great as the discovery of new arts for the bettering of human life. For I saw that among the rude people of early times, inventors and discoverers were reckoned as gods."

The substance of what I wish to say in this paper is in the nature of a criticism and a plea: a criticism of the present scientific status of the dental profession and of the attitude of a certain minor but influential portion of it toward the results of recent research work; a criticism of the loose ways of thinking, speaking, and writing of which we are reminded at least a dozen times a year by the arrival of the monthly dental magazines; a criticism of the insecure foundations of practice as established upon the present basis, and a plea for a better state of things. While I have a keen and appreciative recognition of the great advances made by dentistry during the past twenty-five or thirty years, I have at the same time a deep conviction that the matters to which I am about to call attention are altogether discreditable to a profession which desires to be recognized as scientific both in spirit and in practice. And, further, I feel sure that the suggestions I have to make are not only of value but that they are really expedient,—that the state of mind of the dental profession is, on the whole, ripe for the adoption of measures which will add greatly to its self-respect, to its efficiency, and to its status as a body of scientific men before the world. I have used the word "attitude" in my opening statement with special intent, for I regard the attitude of mind or the spirit in which any subject or problem is approached as of the first importance. There are many men of no great scientific or scholarly attainments to whose judgment I would submit a question involving consideration of original matters in preference to invoking the counsel of many of the professional teachers. The interest or the bias of the professional teacher is too often fixed in the direction of finding "what addition must be made to an *a priori* assumption to represent observations," rather than to inquire "what hypothesis would fit the observed facts." My first plea, then, would be for the cultivation of the true scientific spirit.

What is science, and what is it to be scientific in spirit? The simplest and most comprehensive definition of the term is "a systematized arrangement of natural facts." Any man who is engaged in observing the facts of nature and arranging a record of those facts with special reference to their related significance is, just to the extent of his labors, a scientific man.

"Science," says one of our modern philosophers, "may be properly defined as logically arranged and systematical knowledge, or, more fully, that kind of knowledge which consists of facts carefully ascertained, accurately verified, and logically put together into a system."

A fortuitous concourse of facts is not a science. Clinical observations do not constitute a science. These things bear the same relation to a science that a heap of bricks or roughly-quarried stones do to a palace. They are merely the raw materials out of which the building is constructed. We must first have our facts in abundance, and then our science is constructed by a logical concatenation of the facts.

All true scientific work is an effort to learn those constant and persistent conditions which underlie all natural phenomena, and which we call natural laws. Our chief object in acquiring this knowledge is, or should be, its application to life. That life is highest which is lived in most complete harmony with the laws of existence. When man so lives the very sticks and stones are, as Emerson says, working with and for him. The end of natural science is the bringing of man into harmony with his natural environment. One might paraphrase an aphorism by Swedenborg, and say that all real science has relation to life.

Our interpretation, you see, is sufficiently broad to cover all true science, and sufficiently rigid to exclude all pseudo-science.

And the scientific spirit is an attitude of mind well exemplified in the "first precept" of Descartes.*

"I took the firm and unwavering resolution," he says, "never to accept anything for true which I did not clearly know to be such; that is to say, carefully to avoid precipitancy and prejudice, and to comprise nothing more in my judgment than what was presented to my mind so clearly and distinctly as to exclude all ground of doubt." It was this spirit which led Galileo, when he had made an observation of the moon which seemed to stand in contradiction to facts already in his possession, to write out the observation and place it in a pigeon-hole, where it remained for twenty years before a discovery was made which harmonized it with the previously acquired facts. A smaller man would have thrown himself with great energy into the work of discovering a theory which would reconcile the contradictory facts. But your true scientific man is serene, and content to first of all accumulate facts in the field under observation. He knows perfectly well that in the nature of things a methodical or orderly arrangement of facts will sooner or later suggest the co-ordination or generalization which will explain all.

One of the most striking illustrations of this is found in Darwin's discovery of the law of natural selection. When he returned to England in 1837 he says† that it seemed to him that, "by collecting all facts which bore in any way on the variation of animals and plants under domestication and nature, some light might perhaps be thrown on the whole subject. My first notebook was opened in July, 1837. I worked on true Baconian principles, and, without any theory, collected facts on a wholesale scale. . . . I soon perceived that *selection* was the keystone of man's success in making useful races of animals and plants."

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*"Discourse on Method."

The Life and Letters of Charles Darwin.

In another department of science we have an eminent example of the rich results which follow the method of accumulating facts direct from nature. It has been stated that Edison has made, or has had made and recorded under his instruction, more than one hundred thousand original observations from nature. Up to the present time he has probably not been able to make practical use of half of these observations, but he knows that a use for any one of them may be found at any moment. But the vast practical adaptations of electricity to human use which he has made have grown almost entirely out of his own first-hand studies of nature. And I believe that he has somewhere said that it has cost him almost as much, in time, to unlearn the errors he had imbibed from books as to accumulate his own original store of facts. One is reminded by this of that famous saying of Hobbes. "If," he says, "I had read as many books as other men, I should have been as ignorant as they are." All great teachers and investigators discourage the use of books as primary sources of knowledge. Agassiz would have none of them for his pupils. And just hear what Huxley says upon this point:

"If the great benefits of scientific training are sought, it is essential that such training should be real; that is to say, that the mind of the scholar should be brought into direct relation with the fact; that he should not merely be told a thing, but made to see by the use of his own intellect and ability that the thing is so and no otherwise. The great peculiarity of scientific training, that in virtue of which it cannot be replaced by any other discipline whatsoever, is this bringing of the mind directly into contact with fact, and practicing the intellect in the completest form of induction; that is to say, in drawing conclusions from particular facts made known by immediate observation of nature."*

In contrasting the book-made man with one who has studied direct from nature, he further says, "Not only is he devoid of all apprehension of scientific conception, not only does he fail to attach any meaning to the words 'matter,' 'force,' or 'law' in their scientific senses, but, worse still. he has no notion of what it is to come into contact with nature, or to lay his mind alongside a physical fact and try to conquer it, in the way our great naval hero told his captain to master their enemies. His whole mind has been given to books, and I am hardly exaggerating if I say that they are more real to him than nature. He imagines that all knowledge can be got out of books, and rests upon the authority of some master or other."

That expression "to lay the mind alongside a physical fact" is to me one of the happiest in the voluminous writings of this great teacher and investigator.

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*"Scientific Education in Lay Sermons, Addresses, and Reviews."

To "lay the mind alongside a physical fact," to grapple with it, to feel half-baffled and beaten back again and again, and then at last to conquer,—there is a joy in that which has but little in common with the dilettante delights of our mutual-admiration societies. The scientific method of observation and deduction bears about the same relation to ordinary methods of observation and deduction that a modern battle-ship does to an ancient galley. Ease and efficiency in the application of power is the great practical result of the scientific method. Says Hoffman,* "The nineteenth century is pre-eminently the age of science, and it is an age of the greatest progress for that reason. For the more scientific our knowledge becomes in any sphere of investigation, the more easily and more completely can it be applied to the advancement and elevation of the race."

To attempt at the close of the nineteenth century a defence of science and the scientific method would seem in the nature of work of supererogation. But I think we shall find it is not quite so. The position of a great many men in this respect reminds me of the powers of observation of the old farmer's crows. They knew the difference, you remember, between one man and a gun and two men and two guns. They were even shrewd enough to understand, when three men went into the watch-hut and two came out, that another remained. But there their powers of observation ended. They could count to three, but they never got farther than that point. And so it appears to be with many in their power of application and indorsement of the scientific method. They can count up to three, but that represents the utmost stretch of their scientific imaginations. Beyond that they are like a timid swimmer getting beyond his depth, and they strike out lustily for the shore.

If I put the question broadly and ask, "Is it desirable that our practice as dentists should, as far as is possible, be established on a scientific basis?" there would not be a negative reply. But when we begin to analyze this question and descend to particulars, the case is altogether different. Not only do we find that there is actually but little scientific foundation for a large part of our practice, but when an effort is made to introduce more exact methods it is met by very marked evidence of hostile feeling. The exact methods of science seem peculiarly irritating to many individuals, probably because these methods have such a neat and rapier-like way of puncturing long-cherished delusions, the delusions of the self-styled man of practical common sense.

We have suffered long from the arbitrary rule of this man of common sense, and I for one am ready to rebel. I think him a tyrant, and a dishonest tyrant at that; because when he wants an opinion of any value upon any subject he never goes to one of his kind, but always to the man of uncommon sense or the expert. What is this much-vaunted common sense at its best? I should say it is a compound of about equal parts of very ordinary observation, deep-seated prejudice, and crude metaphysics. Your man of common sense stands on the level of all common things, and he has always chiefly occupied himself in appropriating, without thanks, the valuable things of life which have been provided by men of uncommon sense. He had much better stick to his leather and abandon the *rôle* of critic.

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*"The Sphere of Science." By Frank Sargent Hoffman, Ph.D., Professor of Philosophy in Union College.

Another enemy of all true scientific progress is your person of authority. He has acquired notoriety in some special field chiefly because he can "count to three," which arithmetical feat is beyond those who support him. He is always to the front when a new generalization based upon new facts in his particular field is brought forward. He sometimes presents an outward show of deference, but he has an obvious inward determination never to yield a point. Observing him, one is constrained to believe that the force of the most evident facts is entirely lost upon those who are firmly intrenched behind old and fixed habits of thought. Long-continued concentration of mind and purpose in a fixed direction undoubtedly at last renders the intellect incapable of perceiving the true relation of things when revealed. "The best security for fixedness of opinion is," says Bagehot, "that people should be incapable of comprehending what is to be said on the other side."

Emerson, with characteristic humor, thus scores the ultra conservative man of authority: "Each savant proves in his admirable discourse that he and he only knows now or ever did know anything on the subject: 'Does the gentleman speak of anatomy? Who peeped into a box at the Custom House and then published a drawing of my rat?' Or is it pretended discoveries of new strata that are before the meeting? This professor hastens to inform us that he knew it all twenty years ago, and is ready to prove that he knew so much then that all further investigation was quite superfluous." Still another enemy of scientific progress is the credulous individual,—he who is ready to believe anything that is new to him. He represents the type which goes to swell the ranks of theosophy, faith-healers, and all the great army who believe that everything is like everything else, and that nothing is quite identical with something; in other words, all who fail in their discrimination of the relative values of different facts. One of the great distinguishing features of the scientific method lies in this power to appreciate the relative value of facts. We begin, as Darwin says, by the wholesale accumulation of facts. We collect everything bearing upon the subject in hand that we can find. We recognize that certain facts are more intimately related than others and that some have greater value than others, and we classify our facts according to their relationship and values. And herein lies just the difference between this method and all others. I suppose there is no error in the world which has not some fact as a foundation, and all errors consist in the exaggeration of certain facts out of all relationship to other facts which modify them, and in the forcing of conclusions which the facts do not legitimately warrant. This is the empirical method. The origin of the term, which was not originally one of reproach, dates from the Alexandrian adaptation of Greek medicine, although the Empirics claimed justification for their doctrine in the teaching of Hippocrates. Its salient feature was the rejection of the study of anatomy and a general abandonment of inquiry into the causes of things. Their famous "tripod" of principles, or the sources from which they claimed a knowledge of medicine could alone be obtained, were clinical observation, recorded observation, and judgment by analogy, methods which are certainly to be commended as far as they go. But the difficulty arose in those ancient days precisely as it does now,—viz, in the interpretation, or rather the misinterpretation, of the facts observed. The whole weakness and danger of the empirical method, using the term in its original sense, lies in the ever-present tendency to force conclusions or to found deductions upon incomplete or insufficient data. A good example of this is found in the teaching that because the softening of enamel is a matter of clinical observation, *therefore* the phenomenon must be due to some *intra vitem* change in the tissue. Here was the operation of two principles of the "tripod," clinical observation and judgment by analogy. But the fact never contained the conclusion. It was a pure assumption. This was just the point when Descartes, the father of the scientific method, stepped in with the famous precept quoted, to "comprise nothing more in the judgment than what was presented to the mind so clearly and distinctly as to exclude all ground of doubt." The first steps in the empirical and the scientific method are the same. Both begin with observation, and from observation proceed by processes of reasoning. The reasoning process is largely one of inference. Now, these inferences may be corrct or false, and the special feature of the scientific method is the verification by various means of the conclusions reached by the reasoning processes. This work of verification, in its most complete form, is carried to the point demanded by the conditions of Descartes's precept.

Many ludicrous mistakes by some of the most noted men in history might be quoted to illustrate the dangers of the empirical method. No one would deny that St. Augustine, for instance, was a great thinker, and he had no doubt made some superficial, accidental "clinical" observation which led him to assert that he knew from his own experiments that the flesh of the peacock is so favored by the Almighty that it will not decay. He has told us nothing, so far as I am aware, of the nature of the experiments upon which this conclusion was founded, but we may be sure they would hardly be accepted in any modern laboratory for experimental research.

The empirical method was a stepping-stone to the scientific method, and with the evolution of the latter the former should have passed away. The scientific method includes all of value that there ever was in the empirical method, and adds so greatly to our power of reaching truth that there is much reason for wonder that the ancient habits of thought should find defenders and followers to-day. And is it true that this is so?

Is it true that the results of scientific research meet, in the dental profession, with open hostility, and with what is worse, apathy and inability to appreciate the significance of those results? Is it true that the dental practice of to-day is largely founded upon empiricism? Is it true that our dental literature is saturated to the core with pseudo-science, and with ancient metaphysical habits of thought that have come down from the time of the Greek sophists and from the theology of the middle ages? We shall see. To go not very far back in our literature, let me ask how was Dr. Miller's work received when the results of that brilliant series of investigations were first published? I well remember the intense antagonism with which the dean of one of the leading dental colleges of America opposed those views and demonstrations. It is said that Dr. Miller's conclusions are now accepted in a general way; but, as I happen to know, this means little more than that an attitude of open hostility has passed into one of indifference, at least so far as the logical conclusions in matters of detail of much of his work is concerned. His book is praised as a classic, but is it read and studied to any considerable extent by the profession? If you want a conclusive answer to this question, ask the publishers what is the average annual sale of the book. The attitude of a great majority of the profession is, in this respect, an indorsement of one of Pudd'nhead Wilson's maxims, which is that a classic is "a book which people praise and don't read." It was undoubtedly praise of this sort which led the humorous philosopher to elsewhere exclaim, "A dozen direct censures are easier to bear than one morganatic compliment." Our current literature supplies the strongest proof that much of the praise bestowed upon Dr. Miller's work is in the nature of "morganatic compliments." Have the gentlemen who insist upon believing that enamel possesses some mysterious hypothetical quality which they call vitality, and which they say resists the causes of caries, accepted the teachings of Dr. Miller, who showed that caries could be produced artificially in dead enamel? They must also have observed that the progress of caries is often somewhat retarded when the pulp of a decaying tooth dies. Is this because a dead tooth possesses more "vitality" than a living one? These, and other positions which are still vigorously maintained, are not only opposed to Dr. Miller's teaching, but to all that is best in the results of modern scientific research in kindred fields. We have also seen more recently a somewhat apathetic welcome given to another of the most valuable pieces of scientific work ever done for the dental profession. I refer to the researches of Dr. G. V. Black. Commenced in the true scientific spirit and carried out in the most orderly and rigidly exact method, the results are unimpeachable. I know of but one man who has undertaken to test this work by scientific methods. Mr. Charles S. Tomes, a man of whom it is hardly necessary to say that he is as well qualified to undertake such an investigation as any one living, has been over a considerable portion of the field traversed by Dr. Black. And he found, greatly to his surprise, that the results of his investigations on the whole gave an emphatic indorsement of

Dr. Black's report. If I may be permitted to speak of my own work as frankly as I would of another's, and without any of that affectation of modesty which is so often used as a thin veneer to cover up the coarsest egotism, I should say that it supplemented and carried to completion in certain directions the work of both Dr. Miller and Dr. Black.

Concerning the exciting cause and progress of dental caries, there is now not a missing link in the chain of evidence from beginning to end. With regard to the significance of the facts presented, there is substantial agreement between Dr. Miller, Dr. Black, Mr. Tomes, and others who are qualified to speak. The question which you gentlemen of the dental profession have to consider is this: Are you prepared to set over against the results of this work, which has been conducted according to the best scientific methods of the day, the mere opinions of men who, although eminent as teachers in the profession, have never undertaken anything in the nature of scientific work to disprove our position, nor are they able to bring a single fact to bear against it. The utmost they have succeeded in doing up to the present is to misrepresent our work and our position, and then to proceed to belabor and tear to pieces this scarecrow of their own making. Let us come down to particulars, and see if I am fully justified in making these statements. It would be an easy task to go over the dental journals for the past few years and select a column bearing upon this subject, but I shall confine myself to some of the more recent issues. In the *Items of Interest* for June, 1898, there is reported a meeting of the Central Dental Society of Northern New Jersey, during which one of the oldest college professors in our profession delivered himself as follows: "Dr. Greene Black tells us that all teeth are composed of the same relative proportions of organic and inorganic substances. Wonderful! I will ask, fellow Hornets, if you ever heard of more than one analysis of enamel? Not poor enamel, not good enamel, but enamel. Who has ever heard of more than one analysis of dentin? Who has ever heard of more than one analysis of cementum? These analyses were made in the old days of Fox, by Pepys, almost a hundred years ago. And it has always been so until by some hocus-pocus Dr. Greene Black found that dentistry thought (?) that hard teeth had an excess of inorganics and that soft teeth had an excess of organics! It seems strange that he did not recognize that soft teeth have been called 'chalky' from time immemorial, and that they have been called so because dentistry thought that chalk is an organic material!" Any one who is fond of solving enigmas may undertake an analysis of that remarkable piece of criticism. I have no comment to pass upon it, but I will do what I can to give the widest possible publicity to what an old college professor has to say about such work as Dr. Black has been doing for the past few years.

Of a somewhat different order, and demanding more serious consideration, are the criticisms passed upon Dr. Black's work in a discussion before the Odontological Society of Pennsylvania, reported in the June number of the *International Dental Journal* for the current year. The work of one of our oldest dentists is there quoted to say that "the electrical condition of the teeth is responsible for decay." It seems that "he has written several interesting papers in which he says that it is impossible to estimate how far this condition changes the character of the dentin; and he maintains that it is an abnormal condition that makes the teeth yield to the influence of the acids of the mouth." One can hardly avoid drawing a deep sigh of discouragement in the effort to deal adequately with this sort of thing. It is entitled to a certain amount of respect, and yet it is all so foreign to the scientific spirit and method of working that the situation is much like the old problem put to us in our childhood days: "If a bushel of wheat sells for a dollar, what will six yards of muslin cost?" There is no relation whatever between one part of his problem and the other part or parts. He first brings in a purely hypothetical condition as a premise; he then says that it is impossible to tell what the effect of this condition is. If it is impossible to tell anything about it, of what possible significance can it be? "It is an abnormal condition," he says, "that makes the teeth yield to the influence of the acids of the mouth." This is merely a plain statement of the obvious, and there is considerable evidence that several well-known teachers and college professors who took part in this discussion are in agreement with the wisdom of the teaching.

I suppose almost since men began to think, they have made the mistake of connecting an unrelated inference to a self-evident truth and thereupon founding a specious argument; the self-evident truth in this instance being the statement that teeth decay because of abnormal conditions, and the unrelated inference the theory that the active cause of decay is electrical action.

Now, this problem of tooth-decay seems to some of us a comparatively simple one.

Let me state it in the form of two or three propositions. If you take enamel from the most perfect type of teeth, say from the teeth of carnivorous wild animals, and place the lactic acid of fermentation in contact with this perfect enamel, it will be destroyed, will it not?

Or, to put the proposition in another way, given a gramme of perfect enamel and given sufficient lactic acid to produce a new chemical combination with that amount of enamel, will not the combination inevitably occur when the two substances are brought in contact? We show you that lactic acid is formed by certain micro-organisms in contact with enamel. We show you many appearances of decaying enamel which are identical with appearances produced by the artificial application of lactic acid out of the mouth. And yet you go on talking about the absence of a certain vague vital force or certain electrical conditions of the mouth as being responsible for dental caries. We ask you to abandon this position, or come forward and astound the scientific world by your announcement of the discovery of some hitherto unknown principles of chemistry.

If I were searching for a particularly severe criticism upon some of the positions taken up during the discussion I have referred to, I should find it in a pronouncement made by one of the gentlemen who took part in it. After making a number of general statements relating to the matters under discussion, he says, "We cannot go over all that ground and prove our points, but we can have our theories and believe them." I half suspect that this was a very neat and sly thrust at the general looseness of statement which was so much in evidence on that occasion. The opinions expressed were confessedly founded upon clinical experience, although evidently not upon the facts observed, but upon their interpretation of the facts. And have we not all history before us to show that such interpretation may be made to teach just the opposite of what is true when the observed facts are not interpreted by some exact scientific method or principle? Did not men walk up and down the earth from the days of creation until comparatively recent times, believing and teaching that our little globe was the center of the universe, and did not their daily observations (clinical experience) ever and ever more confirm them in this position? Did not the president of the Western Union Telegraph Company tell Edison that quadruplex telegraphy was contrary to all experience (clinical observation), and in the nature of things impossible? Has not almost every great discovery been opposed on similar grounds and in a similar manner to that taken up by these gentlemen, who *"cannot go over the ground and prove the points, but will have their theories and believe them?"*

For the fiftieth time, perhaps, during the past dozen years the old question of the vitality of enamel was again brought forward at this discussion, and the consensus of opinion was that enamel must be a vital tissue. We have statements that there is organic matter in enamel, and that this has been observed to become "disintegrated" during typhoid. The gentleman who made these statements further says, "If vital changes take place in any tissue, certainly that tissue is not dead." This is another statement of the obvious; but what is the evidence that there ever are vital changes in enamel? "I believe that enamel is living," says another college professor. And he continues, "There are some things we cannot measure with the yard-stick; there are certain things we cannot demonstrate with crucible or test-tube." If this means that there may be certain forces and conditions which science has not yet recognized, I should be among the last to deny such a statement; but, then, what bearing does this have upon our manipulation of purely material things as we understand them to-day? Is the yard-stick to be discredited as an instrument for measuring material things, and shall we abandon the use of crucible and test-tube in our efforts to find out the qualities and relationships of material things? How is it possible to base any scientific procedure upon hypothetical conditions which are admittedly beyond the reach of science? We have never proposed to investigate the unknowable or the unthinkable. We are simply trying to establish a solid basis of scientific facts upon which we may work intelligently, instead of empirically, as those must work who "*cannot go over the ground and prove their points, but will have their theories and believe them.*" I wonder if any of the gentlemen who are so much given to talking about this mysterious, intangible vital force have ever carefully examined their own opinions about it. The use of the word has no significance whatever except as a convenient short-hand expression for the *ensemble* of all the chemical and mechanical forces of the body. To speak of it as something apart from these is, as Huxley long ago pointed out, like speaking of the "aquasity" of water as something apart from the material qualities by which we recognize this substance. The origin of all this so-called vital force, as Tyndall so ably demonstrated more than twenty years ago, is from that great reservoir of *inorganic* force, the sun. To speak, then, of the vitality of enamel is to speak of alleged chemical forces which are operative in this tissue producing chemical changes through the functioning of organic matter. Stripped of the mysterious and the obscure, this is the whole point of the question. Is there any evidence that such changes occur in human enamel? Not a single fact has ever been brought forward to show that such changes take place, and there is the strongest possible evidence against such an assumption. Where do the chemical changes occur by means of which tissues are formed and regenerated? Where is the bone molecule and the dentin molecule elaborated and constructed, or where are the initial steps taken which unvaryingly lead to the formation of bone or dentin, if not in the formative organs of these tissues? Can periosteal bone be formed when the periosteum is destroyed? Or can dentin be formed when the dentin pulp is destroyed? If these questions must be answered in the negative, on what is based the opinion that an enamel molecule may be formed, or, in other words, that the enamel may be regenerated, that either formative or retrograde molecular changes may occur after the destruction and disappearance of the enamel-forming organ? There can be but one possible answer to such questions, and that is, "*We cannot go over all that ground and prove our points, but we can have our theories and believe them.*" Probably the fascination of speculation lies in the infinite possibilities which it presents. And, then, it is so much easier to speculate than to investigate. If you have an active imagination, you may command the admiration of a wide circle by your brilliant suggestions of what *may be* true. And the more far-fetched your hypothesis, the stronger will be your hold upon the wonder-loving multitude. Nor will they lose confidence when your speculations are shown to have no foundation in fact. "When Professor Buckland, the eminent osteologist and geologist, discovered that the relics of St. Rosalia at Palermo, which had for ages cured diseases and warded off epidemics, were the bones of a goat, this fact caused not the slightest diminution in their miraculous power."* There are not a few indications that many in the dental profession prefer the stimulating beverage of theory to the plain but pure water of scientific truth. "Have we not had enough of science for a while?" asks one gentleman, as though he desired less science and more speculation.

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*"Warfare of Science with Theology." Andrew D. White.

"Science is now the dominant fad," says another well-known dentist,—"science arrayed against experience and clinical life, and marshalled by a set of men the bulk of whom have no genius for dentistry." I think we may safely leave the latter part of this statement to the logic of events for its answer, while we inquire who it is that is arraying science against clinical experience. Certainly, no one that I know of, except the gentleman quoted and those who think like him. I know of no science which is not founded upon observation of facts. Science *is* facts or truth in orderly or systematic arrangement. Even the able editor of the *International Dental Journal* says, "The dental profession will not be converted to Dr. Black's deductions or to Dr. Williams's peculiar polemical methods, so long as they confine their work to the laboratory and hold as practically valueless all clinical observation." I suppose there is nothing to be done except to continue to protest against this sort of misrepresentation, and to call upon the editor of the *International Dental Journal* to point out when and where I have ever made the slightest attempt to discredit any clinically observed fact. But the truth of the matter is these gentlemen have not correctly stated their criticism. Their real grievance is that men who have formed a methodical or scientific habit of observing and recording phenomena should refuse to accept their hap-hazard and altogether improved interpretation of the facts, and should have the audacity to put forward other interpretations which are in complete harmony with the facts. I say again to these gentlemen, who have so persistently attempted to discredit our work, it is you and you alone who are trying to array so-called clinical observation against science. I cannot help wondering why it is that those who do not wholly agree with us, or who think it best to hold the matters treated *sub judice* for the present, should find it so very difficult as they apparently do to correctly represent our position when it is stated in the plainest-possible language. I was astounded to read in the recently published report of the chairman of the Section on Anatomy, Pathology, and Surgery of the National Dental Association, that I held views opposed to those of Dr. Cryer on the vascular supply of the tooth-pulp, and to the text-books which represent the blood-supply of the pulps of the teeth as coming from the dental arteries. Let me quote in this connection what I really said. Referring to the nerve-supply of the pulp, I wrote, "There is no doubt about the distribution of nerve-fibers from the inferior and superior dental nerves direct to the pulps of the teeth." A little farther on in the article I say, "The blood-supply of the pulp also arises from two sources, vessels passing from the pericementum *and from the medullary canal* into the pulp." Not a word, you see, in opposition to Dr. Cryer or the text-books, but merely a suggestion that there is, in addition to what has always been accepted, a further source of nerve- and blood-supply.

I have also recently seen myself quoted in the dental journals as authority for the statement that the existence of the so-called dentinal fibrillæ has never been demonstrated. Truly, it seems that one must be very alert in these days if one is to contribute anything toward the advancement of knowledge in the dental profession and save one's reputation for accurate statement at the same time.

It is noticeable that a large part of the opposition to the new view comes from the older men in our profession. They seem to feel that a change of opinion means a nullification of the work of a lifetime. But I regard that as altogether a wrong position. The condemnation comes not in having taught error, which was really not error so long as nothing better was known, but in clinging to that error after it has been shown to be such. I commend to them this saying of Marcus Aurelius, "If any one can convince me of an error I shall be very glad to change my opinion; for truth is my business and nobody was ever yet hurt by it. But he that continues in ignorance and mistake, it is he that receives the mischief."

We would, at least, wish to see the older men in our profession content to rest with work well done. We would gladly honor them and ask them to accept our full and cordial acknowledgment of the faithful way in which they have marched forward under great difficulties. They have made wonderful progress, although handicapped in many ways and carrying heavy burdens. But must the universe stop with their passing? Must the deluge which ends all come upon us as they go? Is it not our business also to put the hand of progress forward a little on the dial of time? Why can they not accept the situation gracefully, and frankly admit that they have not exhausted the possibilities of heaven and earth? But, whether they will do this or not, Nature smiles upon them serenely and, turning the page of her great book to a new problem, calls out the younger class.

The exigencies of the occasion and not lack of material prevent me from giving any further illustrations of the main points of my thesis, but I am sure you must admit that I have presented quite sufficient evidence as to the unscientific nature of much of the substance of the discussions of the present time as they occur in our leading dental societies.

It would hardly be possible to suggest measures of reform in the field I have covered, or sketch a plan for the promotion of original research, without giving some attention to that phase of scientific work foreshadowed by the second text at the head of this paper,—viz, that which has reference to the discovery or invention of materials, appliances, and methods for use in the practice of our specialty. So long as dentistry in its practical application includes so much that is in the nature of a mechanical art as it does to-day, just so long will there be opportunities for invention and for the discovery of new materials and new methods of application and procedure. Let us, without any beating about the bush, come at once to the heart of this part of our subject. What shall be the rights and privileges of the discoverer and inventor, and what shall be the attitude of the profession toward those who contribute in this way to the advance of our calling? Let us set aside all purely conventional and arbitrary ways of looking at this important question, and consider it solely from the point of view of what is right,—from the standpoint of common honesty. The attitude of an influential portion of the profession to-day is hardly in keeping with the sentiment expressed by that great master mind of the Elizabethan era from whom my second text is quoted. Inventors and discoverers in dentistry are certainly no longer regarded as gods, unless it be that a god is a being who is expected to be always doing something for humanity and getting nothing in return for it. A curious and somewhat vague formulation, partly written and partly understood, has arisen in our profession and is called *a code of ethics.* Those who subscribe to this so-called "code" maintain that it is unethical to patent inventions for use in dentistry and to receive an income from such inventions. Inventors and discoverers, when they have produced anything of value, should at once, according to the "code," freely bestow all the results of their labors and investigation upon the profession. Now, ethics is the science of human conduct, of human duties. As a citizen I have my duties to the state or the city. But this relation, like all human relations, is reciprocal. The city or the state also has certain duties to me. It would be very unethical for the state to receive money from me in the form of school taxes and then refuse the benefits of the public schools to my children.

Emerson, in his essay on "Compensation," says, "Benefit is the end of nature. But for every benefit which you receive a tax is levied. He is great who confers the most benefit. He is base—and that is the one base thing in the universe—who receives favors and renders none." There is rich matter in that for those to reflect upon who teach that the inventor should give all that is best of himself to his profession while his profession gives him nothing in return. "That," says the sage of Concord, "*is the one base thing in the universe.*" We have occupied an anomalous and thoroughly dishonest position on this question of inventions from several points of view. We have practically said to the inventor and to the investigator, "While you are devoting your days and nights to the invention or discovery of some useful thing, I will spend my time in increasing my bank account by getting what I can out of my practice or in recreation and pleasure, for I very well know there is a sentiment abroad against the taking of patents. I will therefore improve my worldly position, enjoy life, and remain in the more fashionable circle which disdains to invent things; and when your invention is completed and introduced, if it has any value I shall be able to utilize it without paying for it. I shall be able to exploit it among my patients, and very probably make more out of it than you who brought it into being." This thing has actually been done with many valuable inventions. And it is called high-toned ethical conduct. The humbug and the hypocrisy of it all is positively sickening.

And how does this matter work out practically? Just to the extent that the teaching of the right to appropriate the results of the labors of others prevails, the inventive faculty will cease to be exercised among dentists, and will be turned over completely to the dental manufacturer. There are very few men who will forsake the natural responsibilities of life for original work in any direction when there is no hope of reward held out to them. The present situation is demoralizing in more ways than one. It is not only discouraging to men of genuine talent, but it tends to foster the introduction of a great array of spurious inventions and devices, and that patenting of methods of working against which Dr. Ottolengui is just now waging a vigorous crusade. There has never been a time in the history of dentistry when so many worthless and often harmful remedies and devices were being foisted upon the profession as at this moment. And the remedy for all this is entirely in our own hands, as I shall presently show you. Another extremely inconsistent phase of this question is that it is *not* considered unethical to copyright a book and receive an income from such a work, not even when the substance of the book is entirely made up from material supplied by the inventor, who is not permitted to receive anything for his invention. You may lie in wait for the inventor just around the corner and write up the result of his discoveries, and patent or copyright your stolen work, and make what you can out of it. It is quite ethical to do that! Could any position be more immoral or more deserving of scorn?

Whatever steps are to be taken, if any, for a better organization for the scientific interests of our profession, this department of invention must be included in our plan. In truth, it everywhere so runs into and permeates every phase of dentistry that we cannot dodge it if we would. There are a great number of useful inventions and devices constantly coming forward which have cost their originators but little in time or money. It is proper enough that these should be freely bestowed upon the profession for the benefit of all. It is proper that any invention or discovery should be freely given to the profession, if the inventor or the discoverer is pleased to act in this liberal manner. But the profession has no right to demand this of any one. It is immoral and unethical to do so. And, furthermore, it is inexpedient. The most effective way to prevent valuable inventions from falling into the hands of speculators, who have no interest in the well-being of our profession, is to establish a fund for the monetary recognition of works and devices of considerable value. It is the most simple and effective way of protecting ourselves to do this.

We have thus far been dealing largely with our subject in a general way. Let us briefly consider matters a little more specifically. We are engaged in the work of saving human teeth. Our efforts are aimed at the prevention and cure of those diseases which, if allowed to run an undisturbed course, end in the destruction of the dental organs. Now, as bearing directly upon the present scientific status of the dental profession, I wish to ask two questions. First, to what extent have we made progress in preventing the diseases of the teeth, and, second, to what extent have we established a basis of agreement as to the best methods of treating those diseases when they occur? Here are questions, you see, which involve the very *raison d'ĉtre* of our calling, and they only need to be placed before you to show how poorly established our scientific basis really is. As a profession we have made little or no progress in the prevention of decay. Now, I firmly believe it to be quite within the reach of modern scientific methods to demonstrate how dental caries may be largely prevented. Are we really sufficiently imbued with the spirit of altruism to desire this? That remains to be seen. In the mean time, what have we accomplished? The preservation of the teeth for a certain temporary period. What is the average length of that period? A few years ago a Western dentist, whose name I cannot now recall, undertook a careful estimate of the average time that tooth-stoppings arrested decay. I recollect that period was placed at five years. I have for a long time been giving close study to the rate of progress of dental caries, and I find the rate is not so rapid as has generally been supposed, because there is a primary stage which had been overlooked until my studies of decay of enamel were published. I should think the primary and secondary stages would average about five years. We see, then, that the average time which a filling will arrest decay corresponds very closely with the time that is required by the micro-organisms of decay to produce a new lesion. I submit that this is not a result of which we need feel so very conceited.

Of course, in cases where the conditions under which acid-forming bacteria work are entirely removed, as they may sometimes be, and the work of filling is made *absolutely perfect*, decay in the region treated is permanently arrested. But we all know that such cases constitute but a small proportion of what can practically be accomplished. There are but few patients who will endure the tedium, pain, and expense of such work, and, I may add, there are but few men who can do *absolutely perfect* work when the few patients are found who will submit to it. And so, while desiring to give the fullest possible recognition to all that has been accomplished, I assert that we have nothing to show which can justify complete content with present achievement. We have made some progress toward demonstrating the antecedent conditions of dental caries, but work along this line has been opposed at every step, and one can scarcely take up a dental magazine without finding some expression of doubt even as to the active cause of this disease, while for its prevention there has been but little systematic work done, and that little has taken no firm hold upon the profession. There is a hazy idea abroad that germicides have a tendency to prevent decay of the teeth, but who knows how long any given solution of hydronaphthol, formaldehyd, or chinosol must remain in the mouth to completely destroy the acid-forming micro-organisms? Evidently your so-called practical man takes but little interest in this phase of our duty to our patients. He is quite content with things as they are. Tooth-tinkering is good enough for him. He knows how to convert a human mouth into a perfect Aladdin's cave of gleaming jewels. But what about our tooth-tinkers; are they agreed as to the best methods of tinkering teeth? Certainly not. They do not believe in scientific work, without which it is impossible to find out how even to become the best sort of a tooth-tinker. One says that amalgam is the material *par excellence* for this work, while his neighbor exhausts the possibilities of language in heaping execrations upon that substance. If one elects to make a moderate use of amalgam for filling teeth, and inquires for this much-abused and much-lauded article, he is offered his choice of a hundred or more. Nobody knows which kind is best except the manufacturer. Dr. Black carried out a series of scientific investigations in this direction, but some who have long been before the profession as purveyors of amalgam say that this sort of work is of no account. It is the same with oxyphosphate cements. There are a hundred sorts offered, good, bad, and indifferent. All share and share alike. Nobody knows which is best except the man who has a certain brand to sell. And we dentists, gentle, patient, sheep-like individuals that we are, go on using whatever is pushed under our noses and pay,—aye, there's the rub,—we pay ten times as much for inferior and worthless articles every year as would be required to place this phase of our practice upon a basis of agreement and certainty. Is it not about time that we began to act together and to act like sensible men? Take any department of practice that you please, and the conditions are much the same. Some of the ablest men in our profession say, for instance, that inflamed pulps, if taken during the early stages of inflammation, may always, or nearly always, be treated, capped, and saved alive. Others are certain that this is a pernicious practice, and that a pulp which has once been the seat of inflammation, especially if caused, as it usually is, by the approach of caries, should always be devitalized and removed. Some say that calcareous deposits are always the first step in the formation of pyorrhea alveolaris, while others affirm that such deposits are not present in many cases of the disease, and, when present, are one of the results rather than the cause of the disease.

Nearly thirty years ago, when I attended my first dental convention, they discussed these questions which I have raised. They were discussed long before, and they have been discussed ever since. Once a year some of you charter trans-continental trains to attend the national convention to talk over the same old problems. You talk about them at more frequent intervals in the state and district conventions. Do you not think the time has arrived when it would be well to consider whether some small part of the many thousands of dollars spent each year on these functions might not be advantageously used for the promotion of a little scientific work which would probably settle many, perhaps all, of these questions?

Let me call your attention specifically to some of the problems which await such scientific investigation as shall raise practice out of the present empirical methods:

1. An inquiry into the cause and best methods of treating chemical erosion.

2. An inquiry into the causes of the disease or diseases which attack the pericemental membrane, with best methods of treatment.

3. An investigation which shall comprise a thorough compara-

tive test of the germicidal power of such substances as are provided for the destruction of the micro-organisms of the mouth, and the adaptation of the best of these germicides to use in dentifrices.

4. An investigation for determining the chemical differences, if any, between human saliva and the saliva of various animals which do not suffer from dental caries, and also for determining the comparative inhibitive power of various salivas with reference to the development of micro-organisms.

5. A microscopic investigation which shall involve the preparation by well-known operators of a large number of cavities in extracted teeth, and the filling of some of these cavities by different methods of using gold, and filling others with amalgams from the formulas of Dr. Black and others, and then examining and photographing through the microscope the polished margins where metal and tooth-substance meet; and afterward grinding sections of these specimens to ascertain to what extent enamel affected by the acid of caries has been removed from the margin of these cavities, especially at the cervical margin of approximal cavities.

6. A thorough comparative test of the various oxyphosphate cements in the market.

Let me give a broad, outline sketch of what I would regard as a scientific method in the testing of these cements. I would make a dozen or twenty mixtures of each cement, in which there should be varying proportions of powder and liquid, determined by accurate methods of weighing. These mixtures should be formed into cylinders of, say three-quarters of an inch in length and one-third of an inch in diameter. This form or something approximating to it would, I think, be found the best for the various tests. I would submit the cylinders of the various mixes to crushing tests, to a grinding test in which the cylinders should be forced against a wheel by means of a spiral spring, the wheel being driven by some power capable of being perfectly graduated or determined. This grinding test would probably be the most important test for this form of tooth-filling material, as it would accurately determine the actual resistance to wear, a much more important matter than resistance to crushing power. I would further test these cements with reference to the action upon them of the products of acid and alkaline fermentation. Out of a hundred or more cements tested, we should probably find a half-dozen superior to the others.

These superior cements would be adopted by the entire profession with great benefit to our patients and to ourselves.

Can you imagine anything better calculated to induce the inventor or the manufacturer to reach the highest possible point of perfection in his productions, than the knowledge that these productions must be submitted to the most searching scientific tests?

Here, you see, is the practical application of the scientific method to a few of the most intensely practical problems of our every-day work. And who will undertake to maintain that our methods of practice as applied to any of these subjects which I have mentioned are, at present, founded upon any other than an empirical basis? To-day it is *my* opinion against *your* opinion upon almost every question connected with operative dentistry. Now, we come asking for something better than this. Surely, if it is one of the important duties of the profession to protect the *public* against quackery, it is of still greater importance to protect *itself* against useless and harmful things. We ask, therefore, that the profession shall take up and exercise its own inherent prerogative of passing judgment, not individually and without investigation, but collectively, through its chosen representatives and after the most careful and rigid scientific examination, upon all instruments, appliances, materials, and remedies which are brought before it.

I have no doubt there are individuals ready to come forward now and say they cannot support such a movement as I am advocating, because it seems to interfere with the liberty of the individual and the freedom of competition in trade; and that furthermore an element of great danger might be introduced by the possible opening of a way for favoritism to certain manufacturers. There are several things which may be said in reply to such possible objections. If we feel that the manufacturing companies and all who wish to make and sell articles for our use are more likely to work for our own best interests than our own chosen representatives would be, then it would certainly be better not to take up this branch of the suggested movement. If we believe that competitive trade methods are good for dentistry, then we should raise no objection to secret remedies and the engaging of dentists in the manufacture of trade articles. On the other hand, let us all go in for the commercial system and carry selfish methods to their logical conclusion. If we do not wish to do this, then let us be consistent in pursuing the other course. Let us stop crying Good Lord and Good Devil.

But, really, I firmly believe that such a movement as I am advocating would be in the interests of the manufacturing companies, and all who have the wish to present articles of real merit to us. The losses to the manufacturers arising from the production of expensive articles which prove to be unsalable must be very considerable. The practical indorsement by the entire profession of any article would insure at least a moderate and paying sale of that article. Both invention and manufacture would, I believe, be greatly stimulated by such organization as I am advocating. I am not going to enter my voice in the cry, which is popular in certain quarters, against the manufacturing companies. They have done far too much for the dental profession to be deserving of anything in the nature of wholesale criticism, and as the profession is at present organized I frankly admit that the manufacturers are often our teachers. If you are content with this, let it go on. If not, pray let me make a few practical suggestions for a forward movement. All that I have to present for your consideration in this direction can be summed up in seven words,—viz, concentration of effort and organization of work. Just think for a moment of what is being wasted in the way of money and effort in our profession. Suppose an army was to be sent out on a campaign with such lack of organization as we have. Utter defeat and irretrievable ruin would inevitably await it. There is an enormous amount of energy and individual effort for progress in our ranks, but a very large part of it is wasted for lack of proper organization. Now, suppose a committee or a department were to be created in the National Dental Association, to be known as the Bureau of Original Research Work and Records, or by some such name, with sub-organizations in every state, which should report to the central organization six weeks in advance of each annual meeting; and suppose there were a thousand dentists in the United States who had sufficient interest in the progress and the general position before the world of our profession to contribute five dollars each to a fund for this organization, and another thousand who would give two dollars and fifty cents each, and five thousand more who would give one dollar each.

Here we have less than half of the dentists of this country represented, and even with the small individual tax mentioned we have a fund to start with of twelve thousand five hundred dollars. With that fund and the organization suggested, more real benefit would come to the profession in five years than would come in twenty-five as organized now, and the fund mentioned represents but a small part of what is now wasted every year in the ill-directed efforts toward the same end. But suppose the seven thousand dentists cannot be found to contribute this proposed fund for original research work; suppose we take the ultra pessimistic view that not a dollar can be raised for such a grand work; still, almost incalculable benefits can be secured by an organization which would insure concerted and harmonious action, instead of individual and often antagonistic action, as along present lines. A general plan of work could be arranged by the national committee, and distributed among the state organizations for carrying out. As an illustration, twenty-five or thirty men might be selected to keep a detailed record of a certain method of pulp-capping; twenty-five or thirty might keep a record of a different method, and others, if you like, might be selected for a third method. And so we might go through with the whole list of dental operations, and this method would, in a few years, secure to us much greater harmony in our work and something approaching a scientific foundation for it. I cannot repeat it too often, our interests are too individual, and therefore too diversified and often antagonistic. We need something to knit us together, something to arouse the enthusiasm of the individual, and to make him see clearly that he is acting for his own best good when most active in the interests of the profession as a whole. We are tired of watching the making of patchwork, weary of seeing men play at doing things, like children who build up toy houses of cobs or fagots and then kick them over in mere wantonness or for the pleasure of building them up again.

We are wasting our energies in meandering along crooked paths that come from nowhere and lead nowhither. Let us organize and unite and build a new road, a great scientific highway, as the old Romans built their wonderful roads in Britain, straight down the valleys and over the hills, direct from point to point.

We have been hammering and clamoring for I know not how many years at the door of Medicine, asking, beseeching, begging for recognition as medical specialists; we give ourselves all sorts of names, oral surgeons, oral specialists, stomatologists, and what not, in the hope that we may gain a nod of recognition from the world that shall imply we are somewhat more than what is generally conveyed by the term "dentist;" we have done nearly everything except the right thing, the dignified, manly thing. Now, if we will go to work in real honest earnest, we shall soon enter into our rightful and desired position without asking permission of any of the older organizations. The man who feels that he is master of the situation asks no favors of anybody. Just to the extent that our profession produces work worthy of recognition by the great scientific world, that recognition will come quickly and generously.

I do not wish to see this chosen profession of ours content with a lower level than rightfully belongs to it. I want to see it take its place among the first, and therefore I say, Come, let us join hands, and let all petty jealousies and small ambitions be shamed into silence in the presence of a noble enthusiasm for real progress which shall fill each and all of us.

DENTISTS AS PRESCRIPTION-WRITERS.

BY G. B. SQUIRES, PH.G., D.D.S., SOMERVILLE, MASS.

Do our dental colleges instruct sufficiently in the art of prescription-writing? How many graduates of the colleges in this country are capable of correctly writing a compound prescription from the heading to the signature? Probably the per cent. is very small; yet the ability to do so should be considered by our colleges one of the essentials of a dental education. The ordinary dentist seems to have but a vague knowledge of the terminology of the ingredients in his prescription, therefore he resorts to abbreviations. Probably over ninety per cent. of the dentists use abbreviations in the body of their prescriptions. But it is not in the terminology of the ingredients of his prescription only that the average dentist is lacking knowledge, but in many cases it is wrong or open to criticism in other respects, as will be shown by reproducing prescriptions written by dentists and brought to drug stores for compounding.

Dentists are writing more prescriptions as their profession advances; often they are for internal use and more or less complicated. They argue, and justly so, that they have a perfect right to prescribe internally, the same as their medical brethren, providing they consider such treatment essential for the alleviation of pathological conditions in their branch of medical science. Therefore they should understand how to intelligently write a proper prescription, as well as the nature, both physical and chemical, of the drugs they are prescribing.

It is true that the physician in many cases is not capable of writing a correct prescription, not only as to terminology, but in other respects, as a copy of a prescription written by a six-months-old medical graduate as follows will show:

℞—Cocain muriat., gr. x;
Aq., ℥ii. M.
Sig.—As directed.
N. B.—Do not use the hydrochlorate. Dr. —.

But on the whole the physician is far ahead of the dentist.

Proper terminology may seem a small matter to some, and they may argue that it makes no difference whether the ingredients of their prescriptions are written grammatically and in full or not, so long as the druggist is able to make them out and put up what the dentist intended. But why should not a dentist be able to write the Latin title of a drug or preparation of the Pharmacopœia as well as the Latin names that occur in the study of anatomy and physiology, for example? A failure to do so in either case shows a deficiency in elementary education, an essential to any professional man. Besides, a prescription written in a slipshod manner may be the cause of direct detriment to the author in more than one way. To illustrate: A druggist may have on file prescriptions written by two dentists, both in his locality; number one has written something like this:

℞—Hydrargyri chloridi mitis, gr. iii;
Sodii bicarbonatis, ʒss;
Sacchari, *q. s.*
M. et Div. in chart. No. xii.
Sig.—One every hour till result. Dr. —.

And number two thus:

℞—Hyd. chlor. mit., grs. iii;
Sod. bicarb., ʒss;
Sugar, *q. s.*
M.—Make 12 pos.
S.—As directed. Dr. —.

A person may call at his store and inquire for a dentist (not an uncommon occurrence). The druggist does not know either dentist by reputation, but he refers the would-be patient to dentist number one, feeling sure that the dentist who was capable and painstaking enough to write an elegant and proper prescription would be capable and painstaking in the other branches of his profession. Again, a physician may be called to see a patient, and in getting the history of the case he finds that the patient is already taking medicine prescribed by the dentist for some dental trouble. He naturally wants to know what the medicine is, so that he can prescribe intelligently, knowing that what he gives will not be counteracted or augmented by what the patient is already taking. He asks to see the prescription. If the patient hasn't it, he takes the number and goes to the drug store. Thus the prescription is read and mentally criticised by another educated man. Furthermore, an abbreviated prescription may be the cause of a mistake in the compounding, which in turn may be fatal to the patient,—as will be shown farther on,—and this is the most important reason why a dentist or any other prescription-writer should write his prescription out in full. The patient's welfare should be safeguarded in every possible way, and if the writer does his part the chances of a mistake by the druggist are reduced to a minimum; for in all first-class drug stores—and there is where all prescriptions should be sent—no prescription is ever compounded and delivered to the patient until it has been reviewed by two men; the one compounding handing the prescription to the other, to be compared or checked off by him.

Many dentists seem to think that one must have a thorough knowledge of Latin in order to write a prescription with the proper endings. This is not so. A very limited knowledge and the remembering of a few rules is all that is necessary to write a proper prescription. Of course one must be familiar with the Latin titles and orthography of drugs and their preparations as they appear in the materia medicas and United States Pharmacopœia, and I think most dental graduates are. If not, they should get a United States Pharmacopœia or Dispensatory, and become familiar with them without delay.

If the dentist will acquaint himself with merely two Latin cases—the nominative and genitive—and be able to change the nominative endings of the nouns and adjectives of the Pharmacopœia into the genitive endings,—the case in which they should be in the prescription,—he will be able to write ninety per cent. of his prescriptions correctly instead of ninety per cent. not correctly, as they appear at the present time.

There are certain abbreviations allowable in prescription-writing, as M. for Misce, Sig. for Signa, Chart. for Chartula, etc., just the same as there are certain abbreviations allowable in letter-writing; but the body of the prescription should not be abbreviated, and when it is it shows one of two things,—carelessness or ignorance.

The Latin nominative case corresponds to our English nominative, and the genitive to the English objective with "of." Of course, in the English, when we change a noun from the nominative to the objective case it is still spelled the same, but in Latin, in most cases, the noun is spelled differently; that is, the noun has a different ending. No doubt this will appear decidedly elementary to those who are familiar with the Latin language, but it must be remembered that this is written for those who have, practically, no knowledge of Latin, and who know that drugs and preparations when written in a prescription have a certain ending, but do not know why they have this ending or how to write it.

There are five declensions or methods of forming the cases in Latin, but there are no pharmacopœial words of the fifth, and only three of the fourth; therefore, we have, practically, but three declensions with which to become familiar.

First Declension.

All pharmacopœial nouns and adjectives ending in *a* (excepting aspidosperma, physostigma, and theobroma) are of the first declension, and are placed in the genitive by changing the termination *a* to *æ*,—*e.g.*, gentiana, the pharmacopœial title for gentian, and in the nominative case, in a prescription would be gentian*æ*. Of the 994 articles of the Pharmacopœia about 126 are of the first declension. Now, any dentist that is at all familiar with the titles of the Pharmacopœia or his materia medica can recall many of the drugs and preparations he uses and writes for that end in *a*,—*e.g.*, aqua, tinctura, ammonia, caffeina, morphina, quinina, etc.,—and when he writes for those articles he has merely to change the *a* to *æ*, and he has a properly written prescription.

There are two pharmacopœial nouns of the first declension that end in *e*,—aloe and mastiche,—and their genitive is formed by changing the *e* to *es*,—*e.g.*, aloes. These, with the three noted above, are the exceptions to this rule. Most of the other rules have exceptions. These should be remembered if possible, but not at the expense of the rules. If one should forget the exceptions and write theobroma theobromat*æ*, it would not show so much ignorance as it would to write theobrom.

Below is an example of a prescription whose ingredients are all of the first declension:

℞—Tincturæ calendulæ, ℥ii;
Tincturæ cinchonæ compositæ, ʒii;
Aquæ menthæ piperitæ, ℥iv. M.

Sig.—Mix with equal parts of water and use as a mouth-wash. Dr. —, 113 — st.

Now let us examine this in detail. First, we have in the upper left-hand corner of our blank the sign ℞, and if it is not already there, it should be put there. The ℞ stands for the imperative singular of the Latin verb *recipio* (I take), which is *recipe* (take thou). The mark drawn across the quirk of the R thus: ℞, is part of the sign of Jupiter; this sign representing the prayer to Jove, used by the ancient physicians before beginning their prescription. This has no significance now, but is curiously retained, and illustrates the tenacity of custom. Then translated, ℞ says to the druggist, "Take thou;" the subject "thou" being superfluous, it is contracted to "take." Next is the quantity. The arbitrary sign ℥ has been adopted to represent an ounce, and the Roman numerals for the numbers. This is the customary and proper way to write the quantities. It is also proper to write the quantities in Latin, as shown below, but this involves another Latin case (the accusative), and is optional with the writer. Then translated we have "Take two ounces." Next comes the drug or preparation which we want, and in English would read thus: "Take two ounces of tincture of calendula." "Tincture" and "calendula" are in the objective case, and the Latin genitive being a counterpart of the English objective with "of," would be the case in which they belong in the prescription; so we change calendula to calendul*æ* and tinctura to tinctur*æ*. In the pharmacopœial title "tincture calendulæ," it will be observed that calendula is already in the genitive case, for this title signifies a preparation *of* calendula, namely, "tincture *of* calendula," calendula being already in the English objective or the Latin genitive case. Of course the pharmacopœial title of the drug, calendula, is in the nominative case and written thus: "Calendula." In writing the second and third ingredients we proceed in exactly the same way, with the exception, in the second, of using the arbitrary sign ʒ to represent drachms.

When the quantities are written in Latin the prescription appears thus:

℞—Tincturæ calendulæ, uncias duas;
Tincturæ cinchonæ compositæ, drachmas duas;
Aquæ menthæ piperitæ, uncias quatuor. Misce.

Signa.—Dilute with equal parts of water and use as a mouth-wash. Dr. —, 113 — st.

Directions are very seldom written in Latin in this country, and should not be unless it is desired that the druggist shall write it on the label, for, strictly speaking, the druggist should copy what follows "Signa" *literatim;* and this is done sometimes with German doctors who write their directions in German and expect the druggist to write on the label the same, as it is the only language which their patients can read. Some prescription-writers place "f" before the ounce or drachm sign, thus: (f℥) when they write for liquid preparations; but this is not necessary, as the druggist always uses wine measure for liquids and troy weight for solids, unless specified otherwise by the writer.

Second Declension.

All pharmacopœial nouns and adjectives ending in *us* (excepting Rhus and the three nouns of the fourth declension which follow), and all pharmacopœial nouns and adjectives ending in *um* are of the second declension, and are placed in the genitive by changing the termination *us* and *um* respectively to *i*,—*e.g.*, eucalyptus, eucalyp*ti*, acidum, acid*i*. About 300 titles of the Pharmacopœia are of the second declension. A few familiar to dentists are, aconitum, argentum, arsenosum, chloroformum, dilutum, humulus, ricinus, and syrupus.

Example of a prescription containing ingredients of the second declension:

℞—Acidi arsenosi, gr. i;
Ferri reducti, ʒi;
Extracti taraxaci, *q. s.*
M. et in pil. xxx div.

Sig.—One after each meal. Dr. —, 113 — st.

There are three pharmacopœial nouns of the second declension which end in *on*,—viz, eriodictyon, hæmatoxylon, and toxicodendron, and their genitive is formed the same, that is, by changing the termination *on* to *i*,—*e.g.*, hæmatoxyli.

Third Declension.

All declinable pharmacopœial nouns and adjectives having other nominative endings than *a*, *us*, and *um* are (with five exceptions) of the third declension. The exceptions are those already mentioned,—namely, aloe and mastiche of the first, and eriodictyon, hæmatoxylon, and toxicodendron of the second declension. This is the most difficult declension that we have, for there is no general rule for changing from nominative to genitive that applies to all the nouns and adjectives, as in the other declensions. But there is a rule that applies to all those ending in *as* (excepting asclepias), and more than one-fourth of them end thus. Rule: To place in the genitive change the termination *as* to *atis*,—*e.g.*, sulphas, sulpha*tis*, bicarbonas, bicarbona*tis*, boras, bora*tis*. And another rule that applies to the few that end in *r*,—namely, add *is*,—*e.g.*, æther, æther*is*, liquor, liquor*is*. The remainder, whose endings change when placed in the genitive, are found below and must be memorized,—not a difficult task, as many of them are very similar.

Nominative.	*Genitive.*	*Nominative.*	*Genitive.*
Adeps,	Adipis.	Juglans,	Juglandis.
Alcohol,	Alcoholis.	Lac,	Lactis.
Alumen,	Aluminis.	Limon,	Limonis.
Anthemis,	Anthemidis.	Macis,	Macidis.
Arsenis,	Arsenitis.	Mel,	Mellis.
Asclepias,	Asclepiadis.	Mite,	Mitis.
Aspidosperma,	Aspidospermatis.	Molle,	Mollis.
Bisulphis,	Bisulphitis.	Mucilago,	Mucilaginis.
Bos,	Bovis.	Nitris.	Nitritis.
Calx,	Calcis.	Nux,	Nucis.
Cantharis,	Cantharidis.	Pepo,	Peponis.
Carbo,	Carbonis.	Physostigma,	Physostigmatis.
Chloral,	Chloralis.	Pix,	Picis.
Colocynthis,	Colocynthidis.	Pulvis,	Pulveris.
Confectio,	Confectionis.	Radix,	Radicis.
Cortex,	Corticis.	Rhus,	Rhoïs.
Effervescens,	Effervescentis.	Rumex,	Rumicis.
Erigeron,	Erigerontis.	Sapo,	Saponis.
Fel,	Fellis.	Semen,	Seminis.
Flexile,	Flexilis.	Solubile,	Solubilis.
Glaciale,	Glacialis.	Styrax,	Styracis.
Hamamelis.	Hamamelidis.	Sulphis,	Sulphitis.
Hypophosphis,	Hypophosphitis.	Theobroma,	Theobromatis.
Hyposulphis,	Hyposulphitis.	Trituratio,	Triturationis.
Iris,	Iridis.		

The remainder of this declension are those whose endings do not change when placed in the genitive; therefore we can place these with the three pharmacopœial nouns of the fourth declension, whose endings do not change when placed in the genitive, with those of the Pharmacopœia which are indeclinable. It should be borne in mind that this remainder of the third and those of the fourth declension do change their endings in some of the other cases, but as we are considering only the nominative and genitive singulars, we can place them with those whose endings do not change in any case.

Remainder of Third Declension.

Nominative.	*Genitive.*	*Nominative.*	*Genitive.*
Animalis,	Animalis.	Digitalis,	Digitalis.
Antimonialis,	Antimonialis.	Dulcis,	Dulcis.
Barbadensis,	Barbadensis.	Sinapis,	Sinapis.
Canadensis,	Canadensis.	Solubilis,	Solubilis
Cannabis,	Cannabis	Viridis,	Viridis.

Fourth Declension.

Nominative.	*Genitive.*
Fructus,	Fructus.
Spiritus,	Spiritus.
Quercus,	Quercus.

Indeclinable nouns of the Pharmacopœia:

Nominative.	*Genitive.*	*Nominative.*	*Genitive.*
Amyl,	Amyl.	Matico,	Matico.
Buchu,	Buchu.	Menthol,	Menthol.
Cajuputi,	Cajuputi.	Naphthol,	Naphthol.
Catechu,	Catechu.	Pyrogallol,	Pyrogallol.
Cusso,	Cusso.	Salol,	Salol.
Diachylon,	Diachylon.	Sassafras,	Sassafras.
Elixir,	Elixir.	Sumbul,	Sumbul.
Eucalyptol,	Eucalyptol.	Thymol,	Thymol.
Kino,	Kino.		

Example of prescriptions containing ingredients of the third declension whose endings change when placed in the genitive:

℞—Pulveris zingiberis,
Pulveris piperis, āā ʒi. M.
Sig.—Make a paste with hot water and apply. Dr. —, 113 — st.

℞—Liquoris calcis, ℥iv.
Sig.—Use as a mouth-wash. Dr. —, 113 — st.

Example of a prescription where the endings remain the same:

℞—Thymol,
Menthol, āā gr. x;
Spiritus sassafras, ʒii. M.
Sig.—Apply on cotton. Dr. —, 113 — st.

There are a few exceptions, where the nouns of the Pharmacopœia are neither in the nominative nor genitive case, which are found in such titles as "hydrargyrum cum creta," "syrupus hypophosphitum cum ferro," etc., the "creta" and "ferro" being in the ablative case, placed there by the preposition *cum*, and in a prescription remain the same, thus:

℞—Hydrargyri cum creta, ʒi.

It is fully realized that only a meager amount of Latin knowledge has been given in the foregoing pages, but the fact must be borne in mind that ninety-five per cent. of the prescriptions written involve only the nominative and genitive cases (singular). Those who desire more than the superficial information here given should obtain a book on prescription writing, Gerrish's being an excellent one, and from which much information has been taken for this article.

We will now consider a few prescriptions written by dentists, showing what the mistakes are and how remedied. These prescriptions are not the offspring of a fertile imagination, but true copies of prescriptions written by dentists, and can be found on file in different drug stores:

No. 1.

℞—Tr. aconite, ʒi;
Chloroform, ʒii;
Tr. iodine, ʒi. M.
Sig.—External use. Dr. —.

First, the "tinctures" are abbreviated. Second, the ingredients are written in English. Now, one is at liberty to write his prescriptions in English if he chooses, but it is not considered proper, and there are several reasons against it. One is that the titles of all drugs and preparations of the Pharmacopœia are in Latin, as are the titles in the different books on materia medica and botany. Another is, that Latin is the crystallized language for scientific nomenclature, and is not subject to variations which modern languages are always undergoing. Again, the Latin name of a drug applies to that drug and to no other, while in English one name is sometimes used for two or more drugs; for example, *apocynum cannabinum* and *cannabis indica* are both called Indian hemp; *chimaphila* and *gaultheria* are both called wintergreen; *serpentaria, cimicifuga, senega, asarum,* and *eryngium* are all called snakeroot. If one writes the ingredients of his prescription in English, he should be consistent and finish it in English, writing "mix" instead of M. for *misce*, and "write" instead of *sig*. for signa.

The prescription corrected appears thus:

℞—Tincturæ aconiti, ʒi;
Chloroformi, ʒii;
Tincturæ iodi, ʒi. M.
Sig.—For external use. Dr. —, 113 — st.

No. 2.

℞—Tr. aconit.,
Chloroform,
Iodine, āā ʒii. M.
Sig.—External use. Dr. —.

Besides the criticisms of No. 1 which apply to this, we have the last ingredient, "iodin." The dentist wanted the tincture, but wrote for iodin, the same as the laity (some of them) come into a drug store and ask for fifteen cents' worth of iodin. The druggist puts up the tincture in the case of the laity, realizing their lack of knowledge; but prescriptions written by professional men are supposed to be compounded as written. If this one had been so compounded the result would have been a preparation containing thirty-three and one-third per cent. of iodin instead of two and one-third per cent., as intended.

No. 3.

℞—Morph. sulph., ʒi;
Sacch. lac., ʒss.
M. Div. in po. No. vi.
Sig.—One powder every 4 hours.

In this prescription every dentist will probably be able to detect one mistake besides those that appear in No. 1 and No. 2; but there is another,—namely, the name and address. Every prescription-writer should put his name and address on every prescription that he writes; then if there is any question in the druggist's mind of whether or not the writer intended to write as he has, he can communicate with him without the patient being aware of the fact, and have the mistake, if any, corrected. Your prescription may not go to the druggist to whom you intended or expected it would and who recognizes your chirography, but to one who knows you not; and if you have made a mistake and the druggist wishes to communicate with you, he can do so only by asking your name and address of the patient, or whoever brought the prescription, thus arousing their suspicion, when it could have been avoided.

In this particular case the druggist was quite sure that one grain of sulfate of morphin was intended, but it would have been better if he could have communicated with the writer and been positively sure of the fact. The prescription as corrected:

℞—Morphinæ sulphatis, gr. i;
Sacchari lactis, ʒss.
M et in chart. vi div.
Sig.—One powder every 4 hours. Dr. —, 113 — st.

No. 4.

℞—Phenacetin, grs. xxx.
Div. in chart. No. vi.
Sig.—One every 3 hours till relieved. Dr. —, 113 — st.

Besides the abbreviation of the drug, we have an improper abbreviation for the Latin *grana*, which should be "gr." for both singular and plural. Corrected:

℞—Phenacetini, gr. xxx.
In chart. vi div.
Sig.—One every 3 hours till relieved. Dr. —, 113 — st.

No. 5.

℞—Ext. hamamelis fl., ℥ii.
Sig.—Use as directed. Dr. —, 113 — st.

The dentist intended the so-called extract of hamamelis of the shops, but the patient received what he wrote for,—viz, the U. S. P. fluid extract of hamamelis, made by percolation and evaporation, and containing the tannin and extractive matter of the drug and about thirty per cent. of alcohol,—instead of the non-official preparation which is made by distillation and contains the volatile principles of the drug only, and about fifteen per cent. of alcohol, and for which he thought he was writing. The "use as directed" will be criticised farther on, where it will be more impressive. The corrected prescription appears thus: ℞—Extracti hamamelidis destillatæ, ℥ii; or, better still, the National Formulary title, thus:

℞—Aquæ hamamelidis spirituosæ, ℥ii.

No. 6.

℞—Pond's Extract, Oss.
Sig.—Use as a mouth-wash. Dr. —, 113 — st.

The writer was surprised at the price charged, and thought the druggist was trying to double his proverbial one hundred per cent., not realizing that he had written for a proprietary article and that the druggist had put up just what was written for. Of course a dentist is at liberty to write for "Pond's Extract," "Hood's Sarsaparilla," or any other proprietary medicine that he wishes, but he should not confuse the coined title of a proprietary article with the recognized title of a universal product of the drug store. The writer wanted the so-called extract of hamamelis, and should have written as it appears above in No. 5 corrected. Or, if he was afraid there were two grades and he wanted the best without having his patient pay an enhanced price for a name, he should have written thus: ℞—Extracti hamamelidis destillatæ opt. Oss. As a matter of fact, all reliable druggists carry but one grade, and that is the *best*, which is distilled from the fresh twigs of the shrub *Hamamelis Virginica.*

No. 7.

℞—Tinct. aconiti, ℥i.
Sig.—As directed. Dr. —, 113 — st.

A prescription-writer should never write "as directed" after "signa," one reason being that it may prevent the druggist from detecting a mistake. For example, take a prescription written thus:

℞—Tincturæ gelsemii, ℥i;
Syrupi, *ad.* ℥ii. M.
Sig.—As directed. Dr. —, 113 — st.

This would be compounded by the druggist without realizing the writer had made a mistake, but if written thus:

℞—Tincturæ gelsemii, ℥i;
Syrupi, *ad.* ℥ii. M.
Sig.—Teaspoonful every 3 hours. Dr. —, 113 — st.,

the druggist would at once come to the conclusion that the writer had made a mistake, either in the quantity of the active drug or the finished product, or in the dose. Another reason is that the patient or those attending may forget the whole or part of the verbal directions given by the writer, as happened in the case of No. 7. This was written by an M.D., but will serve as an example to dentists, as they write for this same drug. The writer gave the verbal directions to the patient or attendant: "Take one teaspoonful of the medicine and mix with a wineglass of water, and take a teaspoonful every four hours." The receiver of the directions forgot them, or part of them, rather; he remembered the teaspoonful part; he was positive it was a teaspoonful every four hours, but had forgotten about the water. A teaspoonful of the medicine was given, and the result can be imagined without description.

No. 8.

℞—Acetanilid, gr. x.
Ft. chart No. v.
Sig.—One every 4 hours. Dr. —, 113 — st.

In such a case as this the druggist is always in more or less doubt. He is not sure whether the writer wants the ten grains divided into five powders, or the five powders ten grains each. If the former, it should be written thus:

℞—Acetanilidi, gr. x.
In chart. v div.

If the latter, thus:

℞—Acetanilidi, gr. x.
Fiat chart. tales No. v.

In some cases the quantity would show the druggist how to proceed, but in this case it would not.

No. 9.

℞—Olei ricini, ℥iss;
Aquæ gaulther., ʒss;
Mucilag. acaciæ, *q. s.* ℥iv.
M. Ft. emulsion.
Sig.—Tablespoonful every 2 hours till result. Dr. —, 113 — st.

Besides the abbreviations, we have the q. s. The writer wanted enough mucilage added to make four ounces, but the druggist would have been justified in using four ounces of the mucilage, taking the *quantum sufficit* to mean that the writer considered four ounces a sufficient quantity to make an emulsion, and thus making a six-ounce mixture. It should have been written thus:

℞—Olei ricini, ℥iss;
Aquæ gaultheriæ, ℥ss;
Mucilaginis acaciæ, *q. s. ad.* ℥iv.
M.—Ft. in emulsione.

Or the "ad." without the q. s., the q. s. being really superfluous.

No. 10.

℞—Quinin sulph.,
Ferri reduct., āā gr. 30.
M.—In pill. 30 div.
Sig.—One after each meal. Dr. —, 113 — st.

Besides the abbreviations of the ingredients, we have the abbreviation "pill.," which should be "pil.," the correct abbreviation for both singular and plural; and it is not customary to use the Arabic numerals. Corrected:

℞—Quininæ sulphatis,
Ferri reducti, āā gr. xxx.
M.—In pil. xxx div.
Sig.—One after each meal. Dr. —, 113 — st.

No. 11.

℞—Æther sulphuric, ℥viii;
Sig.—For dentist's use. Dr. —, 113 — st.

We have the abbreviations and the wrong title. The dentist wanted the U. S. P. æther, but this does not contain any sulfur, therefore his title is a misnomer, and has not been used officially by the Pharmacopœia since the 1840 edition. Physicians seldom make this mistake now, but dentists often do. In Squibb's Ephemeris, under ether, he says, "In relation to this article, it is very curious that the old bad name 'sulphuric ether' is still not uncommon even among those who ought to know better." Corrected, it reads thus:

℞—Ætheris, ℥viii.
Sig.—For dentists' use. Dr. —, 113 — st.

No. 12.

℞—Aquæ calcis, ℥vi.
Sig.—Use as a mouth-wash at night. Dr. —, 113 — st.

Should be ℞—Liquoris calcis, ℥vi, the official title. An U. S. P. water is the solution of a volatile substance in water, and an U. S. P. solution is a preparation made by dissolving a non-volatile substance in water. Calcium hydroxid is a non-volatile substance.

No. 13.

℞—Pyrozone, U. S. P., ℥iv.
Sig.—Use with equal parts of water as a mouth-wash. Dr. —, 113 — st.

Pyrozone is not an U. S. P. title and probably never will be, but a coined name owned by one firm, and should not be written for unless the writer wanted this particular firm's product; but instead, hydrogen dioxid, or, better still, the new title of the 1890 Pharmacopœia, which is the proper way, thus:

℞—Aquæ hydrogenii dioxidi, ℥iv.

No. 14.

℞—Tinct. aconiti, ʒi;
Aquæ peppermint, ℥iii. M.

Sig.—Teaspoonful every 4 hours. Dr. —, 113 — st.

Besides the abbreviation, we have a hybrid title in "aquæ peppermint," *aquæ* being Latin and "peppermint" English.

Certain abbreviations in prescription-writing are positively dangerous; for example, acid. sulph. may mean acidum sulphuricum, or acidum sulphurosum. Acid. hydroc. dil. may mean acidum hydrochloricum dilutum or acidum hydrocyanicum dilutum.

Tr. opii camp. (paregoric), containing .04 per cent. of opium, if poorly written, might be read, Tr. opii comp., a preparation made by Squibb, containing two per cent. of opium—five times the amount in paregoric. Potass. sulph. is an abbreviation for potassii sulphas, potassii sulphis, or potassa sulphurata. Cinchon. sulph. might be cinchonidinæ sulphas or cinchoninæ sulphas. Sod. nit. may mean sodii nitras or sodii nitris; and sod. chlor. is an abbreviation for sodii chloras or sodii chloridum.

Following are a few suggestions, facts, etc., which may be of some interest to a few, although somewhat of a digression from the subject under consideration. We should not use the scruple sign in prescription-writing, for if poorly written it might be taken for a drachm. Remember that petrolatum is an official title and that vaseline is a coined name for a proprietary article. We should not say lime-water for solution of lime. Liquor calcis is the official Latin title, and solution of lime the English. We should not say peroxid or dioxid of hydrogen, but dioxid of hydrogen water, the new title of the 1890 Pharmacopœia. It is our duty to accustom ourselves to new titles as they appear in the United States Pharmacopœia; this book being authority and so recognized by the United States Government. Furthermore, it is not the anhydrous compound H_2O_2 that we mean when we speak of dioxid of hydrogen, but a three per cent. aqueous solution of it. We have no more right to say dioxid of hydrogen for dioxid of hydrogen water than we have to say chlorin for chlorin water. Remember that the orthography of the 1880 U. S. P. title, creasote, has been changed to creosote in the 1890; that there is but one "æther" in the 1890 Pharmacopœia, and that it corresponds to the "æther fortior" of the 1880; that the ordinary teaspoon holds more than one drachm, and that in figuring doses we should reckon about six teaspoonfuls to the ounce; that it is bad practice to write for an article which has to be given in drops. The drops from different bottles and droppers differ materially, as do the drops of different liquids. Besides, the patient or attendant may make a mistake in the count and give an over or an under dose. Of course, teaspoons vary in size; but the discrepancy in the active drug is not so great as with drops, on account of its being in a diluted state. Remember that distilled water is the proper menstruum for silver nitrate, and that peppermint water or any other solvent containing organic matter will decompose it; that all fluid extracts of the Pharmacopœia are uniform in strength and that one minim represents the virtues of one grain of the drug; and that tinctures are much weaker preparations and not uniform in strength, varying from five to forty per cent. in the amount of drug which they contain; that the turning red of carbolic acid does not impair its medicinal virtues; that spiritus glonioni is the 1890 title for the one per cent. alcoholic solution of nitroglycerin; that it was acidum arseniosum in the 1880, but that it is now acidum arsenosum; that it is extractum cocæ fluidum now, instead of extractum erythroxyli fluidum; that acetanilid is now official thus: Acetanilidum; that calcii sulphas exsiccatus is the U. S. P. title for plaster of Paris; that methyl salicylas is the U. S. P. title for artificial oil of gaultheria, and that it has the physical characteristics and essential constituents of oleum gaultheriæ; that naphthol is the official title for beta-naphthol; that there is no caffeine citrate, commercially speaking, and that the Pharmacopœia has caffeine, the so-called alkaloid, and citrated caffeine, a mixture of caffeine and citric acid, but not a chemical compound; that elixir aurantii 1880 has been superseded by elixir aromaticum 1890; that ink is preferable to lead in writing prescriptions; and remember that the United States Pharmacopœia is revised every ten years, and that as soon as a new revision comes out the old one becomes like a last year's directory,—it may be right and it may be wrong.

A FEW CONSIDERATIONS IN FILLING TEETH.

BY C. N. JOHNSON, L.D.S., D.D.S., CHICAGO, ILL.

(Continued from page 130.)

GOLD AS A FILLING-MATERIAL.

In considering the characteristics of the different filling-materials, and the indications for and against their use in the varying conditions presented in the mouth, the fact must never be lost to view that gold, so far as its intrinsic merits are concerned, is incontrovertibly the best filling-material we possess. A more perfect understanding of its characteristics and a more complete mastery of the details of its manipulation on the part of the profession would lead to a higher class of service for our patients. Gold cannot always be used, but it can be used more often than it is; and in view of its acknowledged inherent qualifications and its long record as a saver of teeth it should command our highest respect, and call for our best endeavors to obtain a clear conception of its proper management.

Gold is the most willing of all filling-materials to obey our commands, if we know how to ask it,—it is not difficult of manipulation if we understand it. Properly prepared by the manufacturers, and properly cared for after it reaches our hands, it is the most uniform in behavior of any material we possess; but it is somewhat exacting in its demands as to the care that shall be bestowed upon it, and no man need hope to succeed with gold unless he is willing to give to its requirements an adequate measure of study.

Cohesive and Non-cohesive Gold.

All gold for filling teeth should be as pure as it can be made. The distinction between cohesive and non-cohesive gold does not so much relate to its purity as to the condition of its surface. If two layers of gold foil which is perfectly pure and perfectly clean upon its surface be brought into intimate contact at ordinary temperatures, they will cohere. In other words, they will weld cold. Two pieces of gold in this condition cannot be rubbed together without sticking. This is an inherent quality of gold when pure and clean, and it is gold in this state which is termed cohesive gold.

If pure gold foil be exposed to the atmosphere for any length of time it gathers upon its surface an imperceptible film, which, while not affecting the purity of the substance itself, interferes with its cohesion. Two layers of foil in this condition may be rubbed together without adhering. This is called non-cohesive gold.

In accordance with this, it might naturally be assumed that, given a piece of pure gold foil, it could be made cohesive or non-cohesive at will, and this is in strict agreement with fact. A pellet of cohesive gold may be made non-cohesive by exposing it to the atmosphere, or, more expeditiously, by subjecting it to the influence of certain gases,—preferably ammonia gas. This pellet, thus rendered non-cohesive, may in turn be made cohesive by driving off the gases with heat. It is on this hypothesis that we anneal our gold for filling teeth.

The difference in behavior of cohesive and non-cohesive gold under the plugger is readily suggested by the characteristics of the two materials. From the fact that with non-cohesive gold one pellet may be forced across another without adhering to it we are able conveniently to carry such gold into corners of cavities difficult of access and secure ready adaptation to walls, but the absence of cohesion between the layers of foil limits us in any attempt to build it into contours. With cohesive gold we have the advantage of giving any desired form to the filling and obtaining increased strength to the mass, with the limitation of greater difficulty in securing adaptation to points not easy of access. This does not imply that adequate adaptation cannot be gained with cohesive gold. Cohesive gold may be adapted to the wall of a cavity with as great a degree of perfection as can non-cohesive, but the method of manipulation is more exacting and less rapid.

From the fact that a pellet of cohesive gold will immediately stick to gold which has already been placed in the cavity, care must be exercised in adding each fresh pellet to locate it in precisely the position where it is intended to condense it. If it is allowed to come in contact with any part of the surface remote from the point indicated, it cannot be forced across the surface to the proper position on account of its cohesion. With non-cohesive gold there is more latitude in this particular, but, properly placed and thoroughly condensed, cohesive gold may be made to seal a cavity perfectly.

Annealing Gold.

Much of the difficulty experienced by operators in the insertion of gold is due to faulty methods of annealing; and, even among operators who are sufficiently skilled to obtain good results by the ordinary methods, there is much to be gained by adopting some of the more recent advances in this important particular. The great majority of operators are in the habit of annealing their gold by passing it through the flame of a spirit lamp or a Bunsen burner,—a method which has serious objections. In either instance we are never certain of always having a pure flame, and if we do not have a pure flame we jeopardize the working quality of the gold. An alcohol flame is seldom uniform in its character, from the fact that it is so appreciably affected by atmospheric changes. An undue humidity in the operating room will result in a vitiated flame, which shows itself in a yellowish tinge. The presence of moisture in the air always affects this flame, owing to the great affinity which alcohol has for water.

The gas flame from a Bunsen burner is more reliable than the alcohol flame, but it is not without its limitations. The operator is always dependent on the gas company to furnish him a pure quality of gas, and he must watch the burner to keep it in perfect working order if he expects a uniform flame. Even at best, it is doubtful if gold coming in contact with any flame is not more or less contaminated thereby.

Then the manner of annealing followed by many operators is calculated to give unequal results, even with a pure flame. If a pellet of gold be picked up by the pliers and carried through the flame and then to the filling, as is so frequently done, nearly one-half of the pellet is imperfectly annealed. The portion of gold grasped by the pliers is not annealed at all, and for some distance from the plier-points the gold is kept sufficiently cooled by the points to prevent perfect annealing. This accounts for much of the pitting on the surfaces of some gold fillings. A certain portion of every pellet is left non-cohesive, and when wear is brought upon the filling these little particles which were grasped by the plier-points flake off, leaving an imperfect surface. The operator does not notice this defect while building up the filling because of the fact that the end of the pellet most remote from the pliers is well annealed, and this, coming in contact with the gold in the cavity, adheres perfectly, and the whole pellet seems to mallet down to place in good condition. It is only when subsequent attrition on the filling discloses the flaked surface that the operator realizes there is something wrong with the density of his gold; and even then he is quite likely to attribute it to some inherent defect in the gold rather than to faulty methods on his part. This plan of annealing also occasionally leads to another detrimental effect. The operator, in observing the pellet in the flame, notes that it is dark in color for more than half its length from the plier-points, and attempts to get a uniform heating by holding it longer in the flame. This results in the overheating of the pellet at the end most remote from the pliers, and the fusing together of the layers of foil at that point so as to present a harsh, unyielding mass, with which it is impossible to do uniform work. If an operator must employ the flame for annealing he would better use the smallest pliers obtainable, and grasp the minute corner of one end of the pellet and pass it carefully through the flame, or near the flame, till the other end reddens. Then, dropping the pellet in the gold drawer, he should pick it up again at the annealed end and gently heat the other one. In this way both ends are annealed; but even then there is a lack of uniformity in such a method, and it also requires unnecessary time and undue manipulation of the pellet before it reaches the cavity. A pellet should be handled as little as need be from the time it leaves the gold-beater till it is placed in position in the tooth.

Another method employed by some operators to obviate the difficulties just indicated is to roll their foil into a rope of suitable size, and then anneal the entire rope, cutting it into pellets subsequently. An objection to this is found in the fact that with a rope of annealed gold the impact of the scissors in cutting the pellets compresses the rope so that there is a line of condensed gold across each end of each pellet before it is placed in the cavity. This may appear a trivial consideration, and yet it is attention to the minutiæ which goes to make up the most perfect result in the insertion of gold. A pellet condensed at either end in this way is not so obedient to the plugger, nor can it be so accurately manipulated in the performance of delicate work as can a uniform pellet.

The plan of some operators whereby the plugger-point is used to pick the gold from the drawer and carry it to the flame and then to the cavity, is objectionable in several particulars. Unless the point is heated sufficiently to ruin its quality as a plugger, the gold is never perfectly annealed in the region of the point. If it is annealed at all adequately, the point is made so hot as to be painful to the patient on application to the tooth, and the products of repeated oxidation at the end of the point are continually being incorporated into the structure of the filling, which, at best, cannot result to its benefit. There is also a lack of uniformity in the degree of annealing throughout the pellet, the ends being invariably heated higher than the part touched by the plugger-point. The same condition exists, though in a modified degree, when a smaller instrument is used for picking up the gold in lieu of a plugger, as practiced by some operators. Another minor objection relates to the fact that when a pellet is annealed in this way it has a tendency to slightly change its form under the flame, so as to drop from the plugger or annealing instrument and fall into the flame.

In view of these considerations, it would seem desirable for the profession to adopt a different method of annealing gold to obtain the best results. The problem to be solved is simply to heat the gold sufficiently to effectively drive off all gases from its surface without the possibility of concurrent contamination, and with absolute uniformity of annealing throughout the mass. Various methods have been devised for this purpose, the one most employed in the past being to place the gold on a mica or metal tray over the spirit lamp, and allow the heat thus generated to gradually accomplish the purpose; but the most perfect method yet suggested is through the medium of the electric gold annealer devised by Dr. L. E. Custer, of Dayton, Ohio. With this appliance complete uniformity of result is obtained in the most convenient and ready manner, and with no liability of contamination. Even to operators who have been accomplishing apparently satisfactory results by other means, this appliance will soon reveal a working quality to the gold which seems impossible of attainment in any other way, and it is confidently believed that its general adoption by the profession would disarm much of the criticism which is occasionally waged against the manufacturers of gold on the plea of lack of uniformity in preparation. The only procedure necessary is to place the pellets in convenient arrangement on the annealer and turn on the current, which may be left running to the end of the operation. No matter how long the current is on, there is no overheating of the gold. It simply anneals perfectly, without ever fusing any of the layers of the pellets together.

A most satisfactory manner of treating gold from the time it reaches our hands till it is carried to the tooth is to first subject it to the influence of ammonia gas by placing in a small porcelain receptacle a pledget of cotton saturated with aqua ammonia, and setting this in the same drawer with the gold, leaving the box or bottle containing the pellets open, so that the gas may readily act upon them. The pellets are thus rendered uniformly soft, velvety, and manageable. They are absolutely non-cohesive. They may be shaken or rubbed together *ad libitum* without one pellet, even in the slightest degree, adhering to another. When the filling is to be made they should be transferred to the annealer and the current turned on, the result of which will furnish a series of pellets each in its behavior precisely like its fellow. Gold treated in this way has a beautifully soft working quality, devoid of harshness, but capable of perfect cohesion and density under the impact of the plugger.

With gold prepared according to these details, and with the characteristics of its manipulation perfectly understood, it is nearly or quite as easy of introduction into a cavity as any of the other filling-materials, the chief distinction being the greater length of time necessary to insert it. It must be built up piece by piece, while most of the other materials may be added in masses of greater bulk.

For those practitioners who are not convenient to the electric current it is suggested to employ gas for this purpose, by arranging a series of small jets on the same principle as the modern gas cooking burners, whereby the heat may be distributed as uniformly as possible upon a given area, and placing over this a framework supporting a piece of mica or other suitable material to prevent contact of the gold with the flame. On this the gold may be satisfactorily annealed, though not so rapidly nor so perfectly, so far as the regulation of heat is concerned, as by the electric appliance. In case gas is not available the same arrangement may be made with a spirit lamp, but this is slower in its results, and the heat is less readily distributed with uniformity throughout the surface of the annealer.

It would seem that either of these methods was greatly to be preferred to the one so common in vogue of passing the gold through the flame, and a careful consideration of this entire subject of the proper preparation of our gold for filling teeth is hereby strongly commended to the profession. Gold has almost invariably been credited with the advantage of having claimed a more serious study in its management and a greater care in its manipulation than any other filling-material we possess, and yet in this one particular it would sometimes appear as if it had been strangely misunderstood in its characteristics or ignored in its chief requirements.

Different Forms of Gold.

The form in which gold is used in filling teeth is largely one of individual preference, whether in ropes, pellets, cylinders, or strips. Possibly the best results are obtained by a convenient arrangement of the different forms in the same cavity, such, for instance, as starting the filling with a rope of non-cohesive gold of suitable size and building the main body of the filling with pellets or cylinders annealed, followed by strips of heavy gold upon the surface. Some operators are in the habit of twisting their foil into ropes, and cutting these into pellets for general use. Others, whose methods of operating are highly individualized, cut the foil into strips and roll these into cylinders of varying sizes for the special case in hand. One advantage of this method is that the layers of foil constituting the cylinder are arranged in a regular series, one upon the other, and are therefore capable of a more even placement in the filling than when the pellets are cut from a twisted rope. This even arrangement of the layers of foil in building a filling is an item of some importance in its relation to the strength of the filling and its uniform density, but the element of time in the preparation of these cylinders must also be acknowledged as a consideration with the busy practitioner. The prepared pellets or cylinders of graded sizes and lengths, as they come to us from the manufacturers, would seem to furnish a most convenient form for the bulk of our work, and these, supplemented on the surface in cases calling for special density with strips cut from Nos. 30, 60, or 120 rolled gold, are capable of producing a uniformly good result. For the rapid-acting mallet, in cases where it may not seem desirable to use the heavier foils, strips can be prepared by folding the lighter foils and cutting them into suitable widths. For instance, a sheet of No. 4 foil may be folded three times, which makes four layers of foil. This fold is then cut into strips of from two to three millimeters in width, making a very convenient preparation for the rapid mallet.

The form of the different kinds of gold will receive more detailed mention incidentally with the consideration of their introduction into the various classes of cavities.

CRYSTAL GOLDS.

Crystal gold is prepared by precipitating the gold into crystals instead of by beating it into foil. Its working qualities are somewhat different from foil, and its characteristics must be well understood in order to obtain good results. Some operators seem to have a peculiar aptitude for manipulating this kind of gold, and are able to use it more satisfactorily than foil, but for the great majority of practitioners it can never be relied upon to do the same service as foil in the varying conditions presented in different classes of cavities. Its main virtue lies in its tendency to remain placed in the bottom of a cavity when once forced there. It does not so readily curl away from a wall, or rock under subsequent pressure, as does foil, and it is therefore indicated for starting the filling in those cases where the best retentive form to the cavity at this point has not seemed possible of attainment. It is also more rapidly condensed in a cavity, the filling apparently growing in bulk at a greater rate of speed under the plugger than where foil is used; but this very rapidity of growth may prove an element of insecurity in the constant danger of bridging over spaces and leaving a filling imperfect in density. This may readily occur with a careless operator, while the surface of the filling appears satisfactory. The fact that large masses of crystal gold may be inserted into a cavity and matted down to place with apparent ease is calculated to mislead many operators. These large masses behave much like wet snow under pressure,—they condense on the surface but are inclined to remain porous in the depth of the mass. In order to accomplish good results with crystal gold, and do justice to the material, the very greatest care must be used in its manipulation. It will not tolerate the range of usage that will foil, and unless an operator is prepared to give a careful study to its peculiar requirements he would better not employ it. The chief distinction in this connection between foil and crystal gold is that foil demands care, and so expresses itself at every turn, while the other demands equal or greater care, but seems to constantly give the impression that it does not.

As to the form of crystal gold best adapted for serviceable work, those preparations in which the deposit has been carried on long enough at one time to produce crystals or spiculæ of considerable length would seem to offer the greatest promise of usefulness, both as to strength of the finished product and convenience of manipulation. A mat of gold formed of small crystals is granular in structure. It is easily disintegrated in handling, and crumbles so as to waste extensively; while a filling made from it cannot be expected to present the same strength in a given mass that would one made from gold of a more fibrous nature. Another important consideration in this connection is that a fibrous gold may be expected to result in better margins to the filling than one of a granular structure. One serious limitation to some of the crystal golds offered in the past has been the insecurity of the material when built over beveled enamel-margins, on account of the tendency to disintegrate and crumble away. The more perfectly the fibrous arrangement is maintained, the greater strength may be expected of the material. Recent improvements along this line in the manufacture of crystal golds would seem to promise an increased usefulness for them in practice, but, as already intimated, no operator should employ them without a perfect understanding of their peculiarities.

The main points to be considered in manipulating crystal gold relate to accuracy in placing each pellet as it is carried to the cavity, to a careful selection of the cases suitable for its use, and to the proper form of plugger-points. Each piece of gold should be carried precisely to the spot where it is intended to condense it, and it should not be disturbed by too much manipulation before it is condensed. It is quite impossible, with crystal gold of good cohesive texture, to move a pellet of it across the surface of the gold already in the cavity for the purpose of securing a more convenient position. Any attempt to insinuate it out of the location first taken will result in tearing the uncondensed pellet so that it is disintegrated and wasted.

The places where crystal gold is indicated are in starting fillings in difficult cases, and in large, open cavities easy of access, where the gold may be conveniently laid on in regular arrangement and condensed under the eye of the operator. It should not be employed for filling undercuts or remote positions in cavities, on account of the tendency to bridge.

The pluggers best adapted to its use are the oval-faced forms, with shallow serrations. For starting the filling a large point should be used, with vigorous hand-pressure, to carry the mass in front of the plugger instead of puncturing it; but as the filling is being built up too large points must not be used, for fear of failure in density. A convenient method of condensing the main portion of the filling and securing an even surface is to use a rapid mallet with the Royce plugger-points. These points, being oval on their serrated ends, may be swept back and forth across the surface of the filling with little danger of tearing the uncondensed gold away and wasting it, as is sometimes the result with flat-faced pluggers. The Royce pluggers should be held a short distance from the condensed surface, so that the jump of the mallet catches the gold in front of the plugger and mats it to place.

(To be continued.)

DOUBLE RESECTION OF THE INFERIOR MAXILLA FOR PROTRUDING LOWER JAW.

BY JAMES W. WHIPPLE, D.D.S., ST. LOUIS, MO.

A YEAR has now elapsed since the operation of double resection of the lower maxilla was performed for Mr. W. G. K. by myself and surgical associates.

I take great pleasure in further reporting that the operation has proved to be entirely successful in every respect, the result being all that could be desired and more than was hoped for.

The profile and contour of the patient's face and features are very nearly perfect, and the scars can scarcely be noticed by a casual observer. The jaw is strong and firm, and mastication is perfectly done in a normal manner.

He still feels a sense of hesitation about biting very hard substances, just as one hesitates about putting his entire weight on a limb that has been broken, walking with a "limp" long after he is perfectly well. The pulps of his teeth are all alive, and his gums are firm and healthy.

His teeth all occlude properly, each one coming in contact with its proper antagonist. The entire loss of sensation in the lower lip continues. I used his own words, however, in my report when I said that this was regarded as a matter of "inconsiderable importance." There is no sense of loss or physical incompleteness connected with it.

In short, he is entirely well, and moves among his fellows happy in the consciousness that no semi-deformity longer mars his personal appearance or distinguishes him from his formerly more fortunate companions. I regret that, being a very modest young man, he declines to permit me to use his photograph in connection with this article.

My attention has been called to an article by Dr. Eugene S. Talbot, of Chicago, in the *International Dental Journal* for October, 1898.

This article contains a wholly unwarranted assumption, and an entirely unnecessary mistake. I am inclined to believe that Dr. Talbot is gifted with a pair of Sam Weller's famous "patent double million power magnifyin' gas microscopes" instead of the usual visual equipment of ordinary men. The upper jaw of W. G. K. is fairly well developed, the retraction being so slight as to be imperceptible to any except a close observer.

The deformity in his case was caused, as I stated in my plain report of the case in the July (1898) DENTAL COSMOS, by an abnormal growth or development of the lower jaw.

A younger brother of W. G. K. is now undergoing an identical process of malformation, his lower jaw having grown forward more than one-eighth of an inch during the current year. I am observing this curious and extraordinary facial transformation with the deepest interest, and hope in due time to give Dr. Talbot an opportunity to distinguish himself by performing his truly wonderful operation for correcting protrusion of the lower jaw by operating on the upper. The young gentleman may not be a very nice-looking man when Dr. Talbot is done with him, but would no doubt be regarded in the African forests as a remarkably handsome gorilla.

It is interesting to know that these young men inherit this malformation from their grandfather on the maternal side, who was the unfortunate possessor of a similar deformity.

Dr. Talbot says, "Dr. Whipple was still trying to adjust an appliance to hold the parts together on the 26th of the following April."

Dr. Whipple was "trying" to do nothing of the sort. From April 26 to May 4 I adjusted six gold cap-crowns to "correct the occlusion of the teeth." I would hardly have done this on a jaw that needed an appliance to "hold it together." Let me recapitulate. Operation done on December 19, 1897. Patient brought to my office January 10, 1898. Strong osseous union found on February 14. By March 5 all appliances had been removed, and since that time the jaw has had no support of any kind save from the reunited bone.

That I have been so fortunate as to be able to bring about such an entirely successful result in this case is, considering the condition of the patient when brought to my office on January 10, a matter of surprise as well as of gratification to me. Nothing but loyalty to my friend induced me to undertake the work. If the net result of my work has been to "increase the deformity and further humiliate the patient" (*vide* Dr. Talbot's article), I am at a loss to understand why my friend so willingly and gratefully paid me a very handsome fee for my part in the operation. I do not see any reason for the serious doubts entertained by Dr. Talbot as to the continued vitality of the "eight anterior teeth."

Many cases of excision of the inferior dental nerve are recorded in the annals of surgery, and I am not aware of the pulps of the anterior teeth having been recorded as affected by this operation, at least to the extent of the loss of their vitality.

Dr. Edward H. Angle (DENTAL COSMOS, August, 1898) is, I think, too severe in his criticism of the surgeons in this case. They are men of high standing and undoubted skill. But little can justly be said in adverse criticism of the strictly surgical part of their work. However, these gentlemen are amply able to defend themselves. The great mistake made was in neglecting to have the appliance made according to the instructions given W. G. K. by the writer. This was to have been made exactly in the manner described by Dr. Angle in his article. Great was my surprise when I reached the operating room to find the operation in progress without any appliance of any kind having been prepared. Feeling certain that the operation would be a failure, and being entirely unable at that late hour to be of any help to my unconscious friend, I quietly withdrew from the operating room and the case. When the patient again came under my care and authority I proceeded in the manner described in my report, and which I most emphatically insist was the only proper manner at that stage of the case. This is fully proven by the perfect success attained. There was absolutely nothing either "crude, unstable, or unscientific" about my work, and I am quite sure no more perfect result will ever be secured under similar conditions.

It matters but little what Drs. Allport, Brainard, Moses Gunn, and Powell may have thought about this operation, or, for that matter, what Socrates, Solomon, or Moses may have thought about it in their day. The cold fact remains that it has been successfully done, and that settles its standing as a proper surgical procedure.

It may be of interest to modern Don Quixotes to know that a somewhat similar operation was performed more than fifty years ago by Dr. S. P. Hullihen, of Wheeling, Va. (now West Virginia), and that a full and very elaborate account of it may be found in the *American Journal of Dental Science,* January, 1849.*

For my operation it can be justly claimed that it is the first case in which the operation has been done for an uninjured person and solely for cosmetic purposes.

Practical experience in this case has led me to believe that the appliance described by Dr. Angle, and which I originally intended using, is not the proper form of appliance to use. Its lack of adjustability is its worst defect. It would be difficult to make one that would fit the natural teeth after the operation without causing some displacement of the sections at the inferior border, and without interfering with a perfect approximation of the opposing ends. It must not be forgotten that union of the bone may not be secured on one or both sides, in which case the appliance would have to be removed and readjusted. This would be an exceedingly difficult and annoying thing to do with this form of splint.

A continuous cap splint may do very well in cases of ordinary fractures of the lower jaw-bone where the line of breakage runs obliquely across the bone, with irregular and jagged surfaces which aid in holding the parts in position. But the smooth, plane surfaces of a resection operation present many different and difficult problems to evolve, and require very different treatment.

A professional orthodontist may probably be pardoned for attaching undue importance to the occlusion of the teeth. This, however, is, in fact, a matter of minor importance which can be corrected by adjusting gold cap-crowns, and it is immaterial whether two or more such crowns are used or whether they are a little longer or shorter. The prime consideration is a proper approximation of opposing ends of the bone sections, so as to promote a rapid and perfect reunion of all the parts, especially at the inferior border, where they should present a smooth and even continuous surface. The dense bone of the inferior border and the external and internal surfaces must be placed in direct apposition, regardless of the occlusion of the teeth. This can only be safely done by using a wire ligature at the base of the bone; and this should, in my opinion, be regarded as absolutely necessary, otherwise some displacement will surely occur. I will now describe the manner in which my experience and observation have led me to believe this operation should be performed.

In the first place, it should be regarded as a purely dental operation. The surgical part is simple and unimportant, and can readily be done by any surgeon or dentist of average skill.

Models should be made of both jaws, that of the lower jaw approximating the natural bone in size and shape, and which should be attached to the main body of the articulated models by small brass hinges, set vertically, so as to allow of lateral motion. Two lines should now be made on the external surface of the lower model, at the point to be operated upon, exactly one inch apart. A small section should now be removed on each side, between the lines drawn. It will be found that the cusps of the molars will interfere when the posterior sections are moved inwardly. These cusps should be cut down until they clear the opposing teeth, and the natural organs are to be ground off to a corresponding degree. The ends of the plaster sections are now trimmed away, until all the parts are brought to a supposedly proper position. I doubt the desirability and the feasibility of making V-shaped sections, though this feature should receive due attention if indicated by the curve of the jaw.

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*I am indebted to Dr. E. C. Kirk, editor of the DENTAL COSMOS, for this interesting information.

When the sections are waxed or cemented together the distance between the lines should be carefully measured at both borders, and by subtracting these measurements from the original distance of one inch the exact size and shape of the section to be removed can be accurately determined. An adjustable double bone saw having been procured, the same should be so adjusted as to remove a section of the desired width. An Angle molar band should now be fitted to one of the plaster molar teeth, being careful that the screw and nut point in a posterior direction, so as not to encroach upon the space to be operated upon. A similar band should be adjusted to the cuspid or bicuspid tooth, the screw and nut being directed anteriorly. A line should now be marked, using a straight edge of some kind, across both bands, giving the proper angle and direction for the tubes. A gold thread-cut tube is now soldered on the molar band, and an ordinary tube on the bicuspid band. These tubes must not extend over the space to be operated upon, it being intended that all these bands and tubes shall be adjusted to the natural teeth before the jaw is operated upon. A traction bar or screw of the proper length, with a flanged shoulder and a square end, should be made. This is slipped through the bicuspid band tube and screwed into the entire length of the thread-cut molar tube, which it should fit perfectly. A long-handled key, like an old-style watch key, made to fit the square end of the traction bar, should be used for this purpose. An appliance of the same kind is to be made for the opposite side of the jaw. An appliance of this kind can be tightened or loosened at will, at any time that it may be necessary during the treatment of the case, without pain to the patient or trouble to the operator. If any accident or breakage of its parts should unfortunately occur, it can be easily removed and replaced.

Before beginning the surgical work, all of those bands are to be adjusted to the several teeth selected for the purpose. The position of the patient and the flow of blood would make this a very troublesome thing to do if deferred until the surgical operation is completed. All being in readiness, the external incisions are made and the sections sawed almost through. Small holes are now drilled in the end of each of the large sections, near the base line.

The small sections are now entirely removed. A rather stiff copper wire ligature is passed through the holes from the external surface and tightly twisted, thus bringing the ends of the sections firmly and smoothly together at the inferior border. The traction bars are now placed in the tubes, traction applied with the key-wrench, and in a few minutes all the various parts form a firmly fixed and practically immovable whole. A small piece of wood, four inches long, one-half inch wide, and three-eighths of an inch thick, is now placed between the oral teeth. Two rolls of gutta-percha base-plate, one inch long and one-half inch in diameter, are softened in hot water and placed between the teeth on each side of the piece of wood. The jaws are now gently pressed together and the gutta-percha allowed to harden. The wood is now removed, leaving a space through which nourishment can be given the patient. A four-tailed plaster bandage is now applied, and the operation is ended. The wounds at the points of incision are to be dressed every other day. The mouth should be carefully washed once or twice a day with listerine. No wash containing formaldehyd should be used, as it will cause sloughing of the gums and a peculiarly annoying soreness of the teeth in the anterior section.

Fellows's syrup of the hypophosphites should be administered. In from twenty-one to twenty-eight days the bone should be strongly knit together, since of all bones the lower maxilla reunites the most rapidly. Within six weeks the patient ought to effect a full recovery, happily forever free from the distressing deformity that has made life full of unhappiness and humiliation.

One assumes a serious and solemn responsibility in entering upon the performance of such an operation on a healthy and otherwise perfect jaw, but I believe the ends attained fully justify it in all these cases of pronounced deformity. I can see no reason for regarding it as a dangerous operation. Done under strict and proper aseptic conditions, the chances of a failure are very remote. There is, of course, a possibility of blood-poisoning, but this is an ever-present danger in all operations, even the simplest. The extraction of a tooth or the opening of an abscess may cause death, but that remote possibility does not prevent the most cautious of men from doing these things.

Double resection is a perfectly legitimate and safe operation, and I believe that it should and will become a merely ordinary one in course of time. In the case of W. G. K., fortunately for the future of the operation, every probable difficulty and danger were met and successfully combatted. This fact should greatly encourage the timid and give boldness to the daring in the performance of an operation which has such possibilities for the relief of suffering and the restoration to symmetry of the human face divine.

CLASSIFICATION OF MALOCCLUSION.*

BY EDWARD H. ANGLE, D.D.S., ST. LOUIS, MO.

The term "irregularities of the teeth," as it is usually applied to express teeth that are twisted or unevenly arranged, does not, in the author's opinion, properly express the full meaning of these deformities. It would seem that the term malocclusion would be far more expressive; for in studying the subject we must not lose sight of the importance of the dental apparatus as a whole and the important relations not only of the two arches to each other, but of the individual teeth to one another. The shapes of the cusps, crowns, roots, and the very structure are all designed for the purpose of making occlusion the one grand object, in order that they may best serve the purpose for which they were designed,—namely, the cutting and grinding of the food. Examined carefully, it will be seen that there can be no "irregularities" of the teeth if they are in perfect occlusion, but that all must be regular and even, each contributing to the support of the others, and all in perfect harmony. Not only this, but the jaws, the muscles of mastication, the lips, and even the facial lines, probably, will be in best harmony with the peculiar facial type of the individual.

Therefore, it would seem that the term malocclusion of any tooth or number of teeth would not only better express the true condition, but naturally and constantly suggest the paramount importance of occlusion in the study and treatment of these deformities, instead of making it secondary or even losing sight of it entirely, as has been too much the case in the past. The author has become firmly convinced that occlusion is the very basis of the science, and that in the treatment of cases, unless occlusion is established, the results will be largely of the nature of failures. So in the pages that are to follow we shall make occlusion the central thought, and on it base the classification of "irregularities" as well as the nomenclature; and will define orthodontia as being that science which has for its object the correction of malocclusion of the teeth.

DIAGNOSIS OF CASES.

In every case of malocclusion of the teeth presented for treatment the importance of a correct diagnosis of the true conditions, and the requirements, cannot be overestimated. Otherwise any plan of treatment will be very uncertain as to results; in fact, most apt to lead to failure with all of its embarrassments.

From an extensive intercourse with dentists and students I am impressed with the belief that although diagnosis is the question of greatest importance, it is yet apparently the least intelligently studied and comprehended.

In the beginning, I wish to thoroughly impress the necessity for complete separation of *diagnosis* from *treatment*. This statement seems necessary for the reason that I have so frequently noted a mental conflict in the endeavor to consider the two together in the first instance, the question of treatment by appliances or by extraction apparently forcing itself into the first view before the facts upon which these should be based have had due consideration. As a matter of fact, if the diagnosis of any given case is first thoroughly mastered the line of treatment and the appliances necessary to bring about the various tooth-movements required are, in nearly every instance, clearly indicated, even to the devices necessary for retaining the teeth when correctly placed.

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*From a forthcoming book by the author.

In order to diagnose all cases of malocclusion correctly it is necessary to be familiar with, first, the normal or ideal occlusion of the teeth; second, the normal facial lines. These must be so fixed in the mind as to form the basis from which to reason, and to intelligently note all deviations from the normal; and it must follow that without clear, fixed, and definite ideas as to the normal, the limits or boundary lines of the abnormal must also be vague and indefinite, and the line of treatment the merest empiricism.

A knowledge of the occlusion of the teeth being of the first importance, should embrace a knowledge of not only the normal relations of the occlusal surfaces of both permanent and deciduous teeth, but of their entire forms and structures. The growth and normal development of the jaws and muscles, together with the development of the teeth and the normal periods for taking their positions in the arches, should receive careful attention. Our perceptions of the subject would be broadened also by a comparative study of the occlusion of the teeth of the lower animals.

NORMAL OCCLUSION.

This knowledge is the basis of the science and the most important lesson to the student of orthodontia. The limits of this work will, however, permit of the consideration of only the most important of its many phases.

By referring to Figs. 1 and 2, which represent the teeth in the ideal occlusion, it will be seen that each dental arch describes a graceful curve, and that the teeth in these arches are so arranged as to be in the greatest harmony with their fellows in the same arch, as well as with those in the opposite.

The lower arch is somewhat smaller than the upper, so that in occlusion the labial and buccal surfaces of the teeth of the upper jaw slightly overhang those of the lower. The key to occlusion is the relative position of the first molars. In normal occlusion the mesio-buccal cusp of the upper first molar is received in the sulcus between the mesial and distal buccal cusps of the lower, the slight overhanging of the upper teeth bringing the buccal cusps of the bicuspids and molars of the lower jaw into the mesio-distal sulci of their antagonists, while the upper centrals, laterals, and cuspids overlap the lower about one-third the length of their crowns. The upper central being broader than the lower, necessarily extends beyond it distally, overlapping, in addition, about one-half of the lower lateral; the upper lateral occludes with the remaining portion of this tooth, and with the mesial incline of the lower cuspid, the mesial incline of the upper cuspid occluding with the distal incline of the lower; the distal incline of the upper cuspid occludes with the mesial incline of the buccal cusp of the lower first bicuspid; the mesial incline of the buccal cusp of the upper first bicuspid occludes with the distal incline of the buccal cusp of the lower first bicuspid.

FIG. 1.

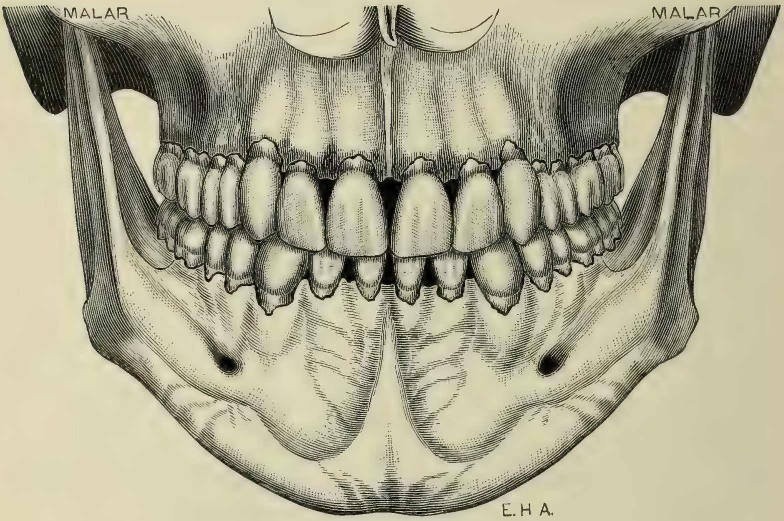
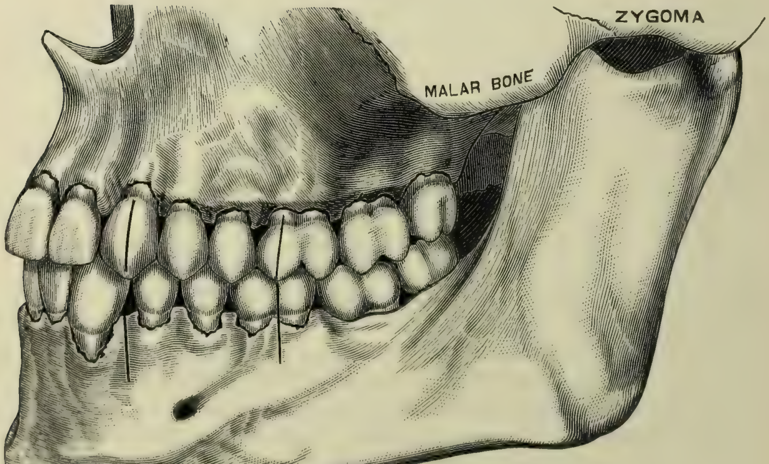


FIG. 2.



This order is continued through the bicuspids. The mesial and distal inclines of the mesio-buccal cusp of the upper first molar are received between the mesial and distal buccal cusps of the lower first molar, and the inclines of the disto-buccal cusp are received between the disto-buccal cusp of the first lower and the mesio-buccal cusp of the second lower. This same order is continued with the second and third molars, the distal incline of the disto-buccal cusp of the upper third molar having no occlusion. It will thus be seen that each of the teeth in both jaws has two antagonists or supports in the opposite jaw, except the lower centrals and the upper third molars.

As the inclined planes match and harmonize most perfectly in the bucco-occlusal relations of the teeth, so there is a similar arrangement in the linguo-occlusal relations, except that the lower bicuspids and molars project beyond the upper into the oral space; likewise in the transverse arrangement, the buccal cusps of the lower molars and bicuspids pass between the buccal and lingual cusps of the upper molars and bicuspids, and the lingual cusps of the upper molars and bicuspids between the buccal and lingual cusps of the lower molars and bicuspids. The grinding surfaces are thus enormously increased in extent and efficiency over what would be possible if they consisted of a single row of cusps or of plane surfaces. But increase of masticating surface is not the only, perhaps not the most important, reason for this complex interdigitation of the cusps and inclined planes of the teeth. A very important office of the interdigitating cusps and planes is the part they play in the mutual support of the teeth. The sizes, forms, interdigitating surfaces, and positions of the teeth in the arches are such as to give to one another, singly and collectively, the greatest possible support in all directions.

Another important part played by the inclined planes of the cusps is in influencing the directions of the teeth while erupting and taking their positions in the arches. If, however, their influence is perverted, they may become mischievous factors in the production of malocclusion. When the teeth first emerge from the gums considerable displacement is often noticeable, but this need occasion no uneasiness, provided, as eruption progresses, their cusps pass into the normal influence of the inclined planes of the opposing cusps; but once passed beyond the normal influence into the abnormal they will not only be deflected from their proper relations in the arch, but will assist in the displacement of the opposing teeth, as well, oftentimes, as of those which are to follow in eruption.

So the dividing line between harmony and inharmony of occlusion is often very slight. Hence the importance of careful attention during the important period covering the eruption of the permanent teeth.

The Forces which Control Occlusion.

Harmony between the upper and lower arches and their teeth is also powerfully promoted by their normal action and reaction upon each other. As the teeth of the lower arch erupt before those of the upper, and are consequently to an extent fixed in their positions before their antagonists appear, it follows that the lower arch is the form over which the upper is molded. In other words, the lower arch exerts a controlling influence over the form of the upper and the positions of the teeth therein. Of course, the upper reacts upon the lower, but it is unquestionable, in the author's opinion, that the lower arch is the more important factor, not the upper, as has hitherto been taught.

It will thus be readily seen how greatly one arch contributes to the other in maintaining its form and size so that pressure, as, for example, on the labial surfaces of the upper incisors, would be resisted not only by all the upper teeth acting as keystones in an arch of masonry, but also by the teeth of the lower arch acting through occlusion.

Inversely, then, one arch cannot be altered in shape without modifying that of the other, nor can it be altered in size without soon exercising a marked effect upon the other.

This important fact is of the greatest interest to us as students of orthodontia,—namely, that in a case of perfect occlusion, as in the illustrative case shown, each tooth is not only in perfect harmony with every other, but helps to maintain it in its harmonious relations; *for the cusps interlock and each sloping plane serves to not only keep the tooth in position, to prevent it from sliding out, but to wedge it into position if slightly malposed;* that is, if not beyond the normal influence of the inclined plane.

A careful study of the relations of the inclined planes and the marginal, triangular, transverse, and oblique ridges, in connection with the movements of the jaw, cannot fail to impress thoughtful persons with the wonderful efficiency of the human teeth for incising and triturating the food required by man, and with the marvelous arrangement for self-cleansing and consequent self-preservation which they display.

The harmonious relations of the occlusal planes and of the dental arches are further assisted by another force,—namely, muscular pressure, the tongue acting upon the inside and the lips and cheeks upon the outside of the arches. The latter serve to keep the arches from spreading, as do the hoops upon the staves of a cask; the former prevents too great encroachment upon the oral space. I am satisfied that this muscular pressure is a far more important factor in relation to the study and correction of malocclusion than is generally recognized. It not only contributes to maintaining the teeth in their normal positions and to harmony in the size of the normal arches, but it is equally powerful in maintaining inharmony in the sizes or relations of the arches and malocclusion of the teeth, when once established.

So it will be seen that the occlusion of the teeth is maintained, first, by the occlusal inclined planes of the cusps; second, by the support given by the interdependence of the arches due to their harmony in sizes when in normal relations; third, by the influence of the muscles labially, buccally, and lingually.

The illustrations show the result where these forces have acted normally,—a harmoniously aligned and occluded denture.

It should be borne in mind that these influences are none the less powerful in cases of malocclusion.

It is interesting and instructive to note the result of these forces even in the earliest indications of malocclusion.

Fig. 3 illustrates a developing form of malocclusion very common, and familiar to all observing dentists. The case is that of a child where the four lower permanent incisors are fully erupted, but one of them (the left lateral) has been deflected lingually (Figs. 3 and 4), the arches being thus deprived of the wedging and retaining influence of this tooth. The external pressure of the lips has closed the space and diminished the size of the arch.

FIG. 3.

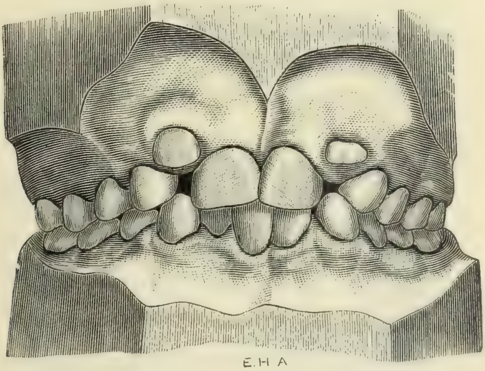
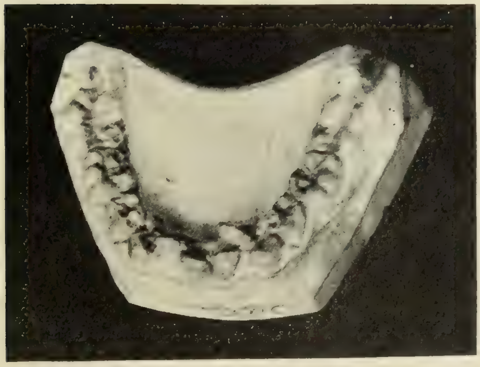


FIG. 4.



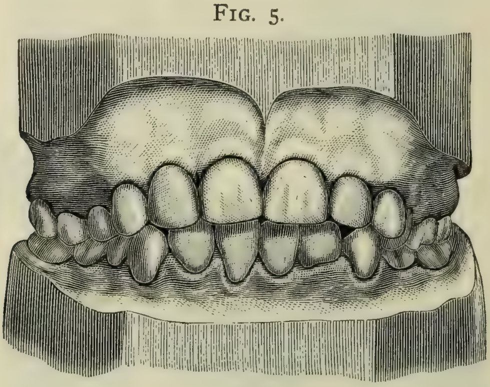
At the same time pressure of the lips and cheeks (aided by the occlusal planes) is gradually molding the upper arch to conform to the abnormal size of the lower.

It will thus be seen how effectually the maintenance of the malocclusion has been provided for, and how hopeless it is to expect nature to correct these deformities unaided. As well might we expect the self-cure of strabismus of the eye or curvature of the spine. How absurd, even pernicious, then, is the common advice of many dentists to parents to "let nature alone and the teeth will straighten themselves."

Recognizing the potency of these influences, it must be apparent to every thoughtful observer that cases of this kind, instead of being self-corrective, will become more and more complicated as time goes on and each succeeding permanent tooth is erupted. In all such cases the positions of the incoming permanent incisors should be guarded with jealous care, and be maintained by corrective procedure if necessary, when, unless there be unusual influences or tendencies toward malocclusion, the positions of the teeth in the upper arch will be directed normally. (Fig. 5.)

On the other hand, for the reason previously stated, if the teeth of the lower arch are permitted to remain in malposition, even to the slightest overlapping of one or more of the incisors or cuspids, the normal size of the arch will be diminished to that extent, with a corresponding contraction of the size of the upper arch by some form of bunching as a result of the influence of the lips.

Fig. 5.



The absurdity, then, of correcting the malpositions of the teeth of the upper arch alone, without equal attention to those of the lower, as is so often done, becomes apparent. These same influences may be traced in a similar manner in any of the cases hereinafter illustrated.

Line of Occlusion.

When the teeth are in normal occlusion the line of greatest occlusal contact will be found to pass over the mesial and distal inclined planes of the buccal cusps of the molars and bicuspids and the cutting-edges of the cuspids and incisors of the lower arch, and along the sulcus between the buccal and lingual cusps of the upper molars and bicuspids, thence forward, crossing the lingual ridge of the cuspids and the marginal ridges of the incisors at a point about one-third the length of their crowns from their cutting-edges. This we shall call the line of occlusion.

This line describes more or less of a parabolic curve, and varies somewhat within the limits of the normal, according to the race, type, temperament, etc., of the individual, and must be determined in any given case of malocclusion by the judgment of the operator after a careful study of the features, facial lines, forms of teeth as related to temperament, etc.

In the diagnosis of cases it is important that we should have this definite line as a more accurate base from which to reason than the coarser outline, as indicated by the incisive and occlusal ends of the teeth.

Nomenclature of Malocclusion.

All teeth found out of harmony with the line of occlusion may be said to occupy positions of malocclusion, and each tooth may occupy any of seven malpositions or their various deviations and combinations.

A definite nomenclature is as necessary in orthodontia as in anatomy. The indefinite outlines and mere phrases heretofore used are totally inadequate. The terms for describing the various malocclusions should be so precise as to convey at once a clear idea of the nature of the malposition to be corrected. The author therefore suggests the following, which, while perhaps not perfect, still seems to be a great improvement over present usage.

For example, a tooth outside of the line of occlusion may be said to be in buccal or labial occlusion; when inside this line, in lingual occlusion; or, if farther forward mesially than normal, in mesial occlusion; if in the opposite direction, in distal occlusion; if turned on its axis it is in torso occlusion. Teeth not sufficiently elevated in their sockets would be in infra-occlusion, and those that occupy positions of too great elevation would be in supra-occlusion.

These different malpositions, in their modifications and combinations, form the basis for limitless variations of occlusion from the normal, from the simplest to the most complex, in which may be involved not only the malpositions of all the teeth, but even the relations of the jaws, resulting in marked deformities and producing appearances even repulsive.

Classification of Malocclusion.

As already stated, there can be but seven distinct positions which teeth in malocclusion can occupy. These, with their inclinations, form combinations practically limitless in variety, to the casual observer presenting differences so distinctive as to render each apparently wholly dissimilar from all the others. Failure to grasp the underlying principles has given rise to the teaching that, as each case is so radically different from all others, it necessitates the invention and construction of an appliance to meet its special requirements.

In reality all cases of malocclusion may be as readily arranged in well-defined classes as plants, animals, or the elements; and by thoroughly mastering the distinguishing characteristics of occlusion and of the facial lines peculiar to each class, the diagnosis of any given case is greatly simplified.

At the same time, familiarity with the possibilities of tooth-movement and with the changes requisite to each distinct and separate class, to attain harmony in occlusion and in the facial lines, and a knowledge of the standard appliances designed for each special class as best suited to produce these changes, will reduce the difficulties of treatment to the minimum.

FIG. 6.

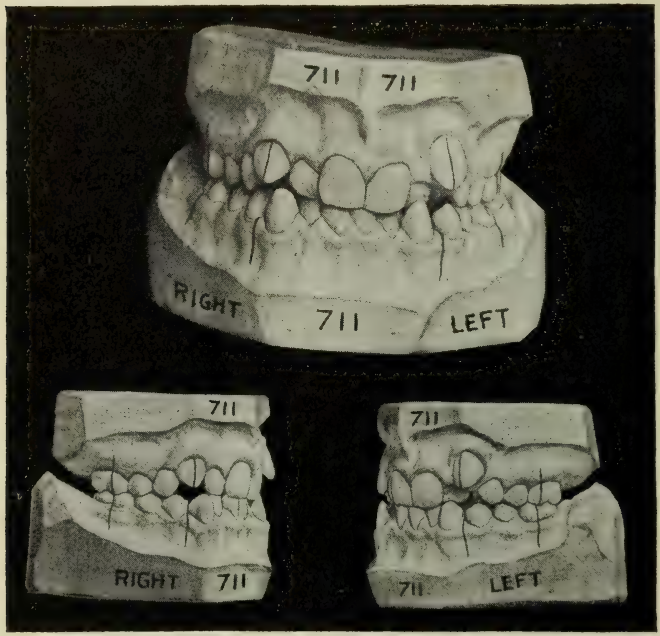
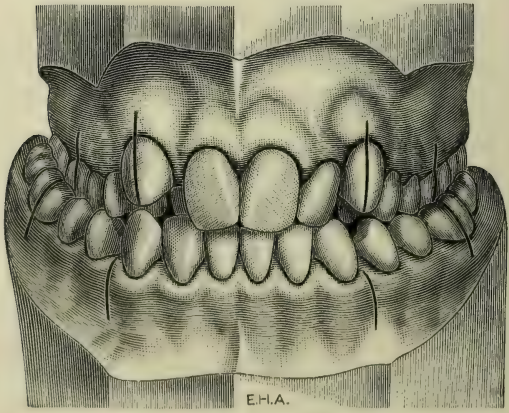


FIG. 7.



In diagnosing cases of malocclusion we must consider, first, the mesio-distal relations of the dental arches; second, the individual positions of the teeth. In what is said upon diagnosis and in the classification which follows, for convenience, two points have been selected from which to note variations from the normal in the arches. These points are indicated by dark lines in the engrav-

FIG. 8.

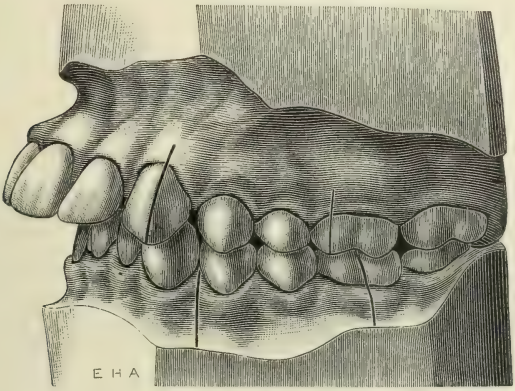
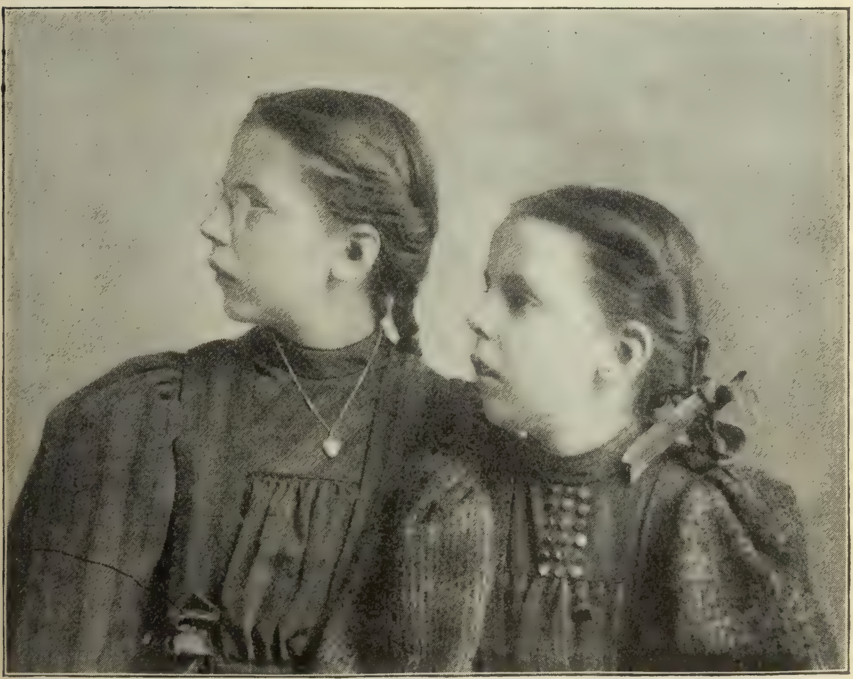


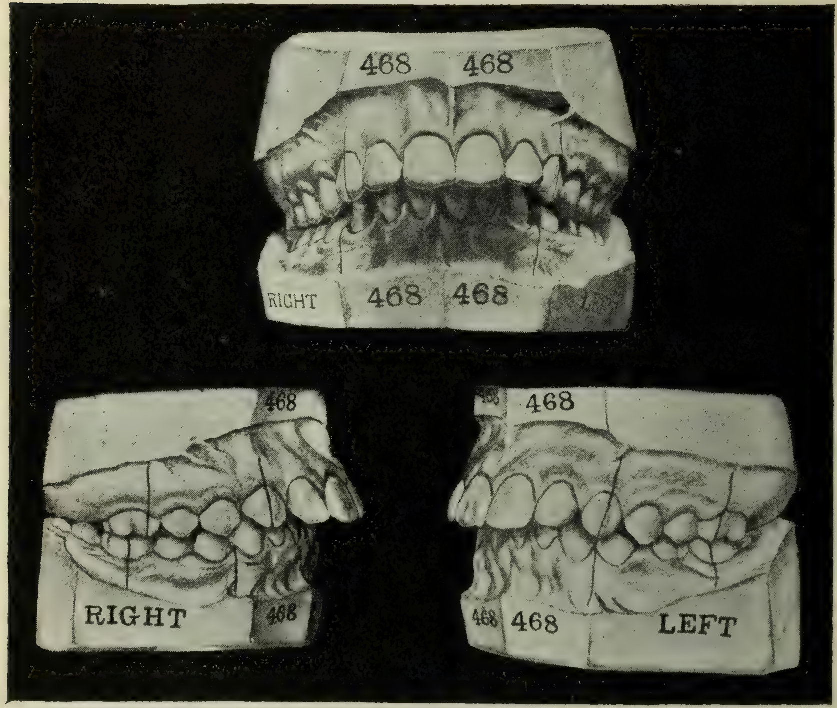
FIG. 9.



ings, which show the normal relations of the cuspids and mesiobuccal cusp of the upper first molar with the buccal groove of the lower first molar.

Of course, in determining the mesio-distal variations *all* of the teeth are to be taken into consideration, but the points indicated have long been favorites with the author in beginning the diagnosis of cases, for the reason that the first molars and cuspids are far more reliable as points from which to judge, owing to the fact that they are found to occupy *normal* positions far more often than any of the other teeth, the molars being less restrained in taking their positions, while the cuspids, owing to their history and great size, force their way usually into relatively normal positions in their arches.

Fig. 10.



Class I. Fig. 6. Relative position of the dental arches, mesiodistally, normal, with first molars usually in normal occlusion, although one or more may be in *lingual* or *buccal* occlusion. Cases belonging to this class far exceed in number those of all other classes combined (see table), ranging from the simple overlapping of a single incisor to the most complex, involving the positions of all of the teeth of both arches. (Fig. 7.)

The average case, Fig. 6, is where the malocclusion is principally confined to the incisors of both upper and lower arches.

FIG. 11.

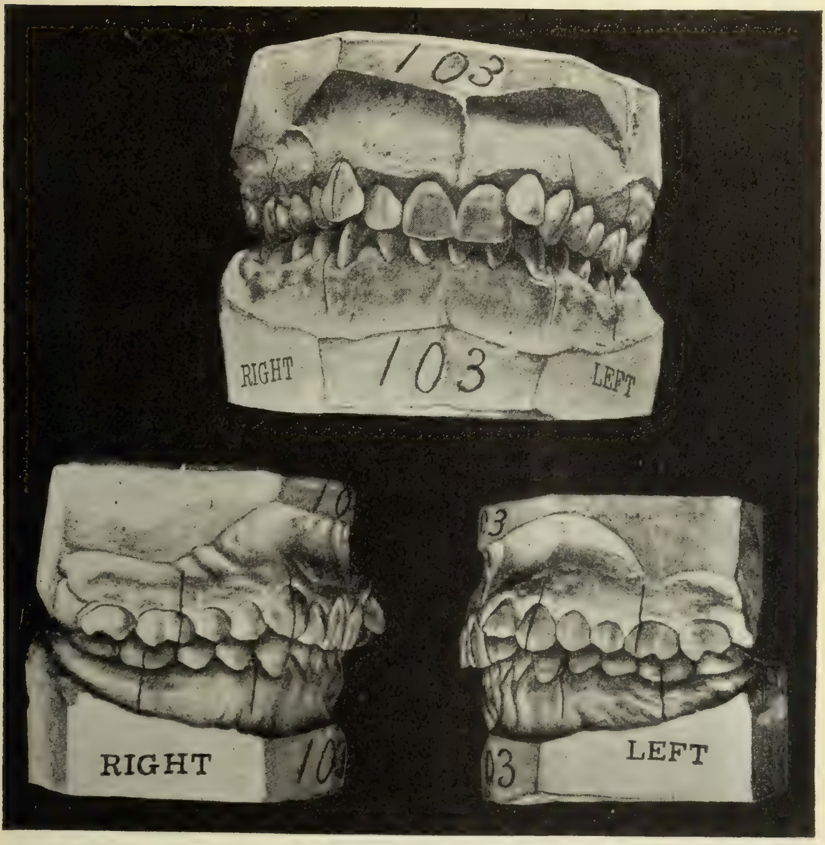
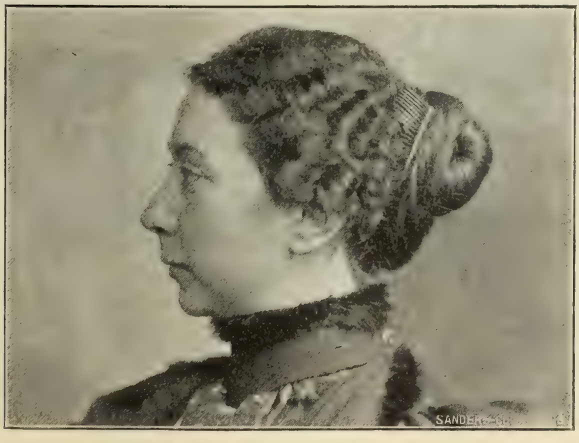


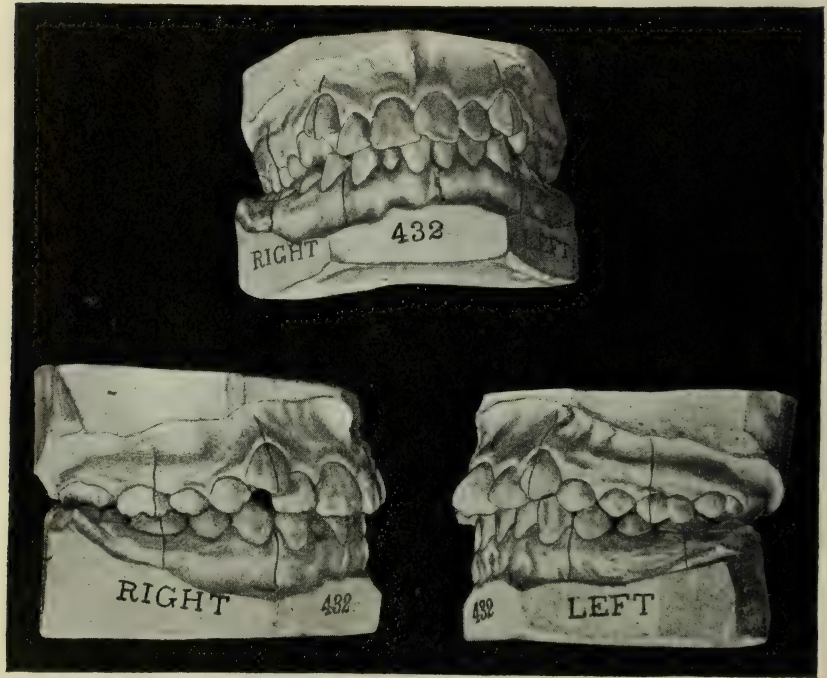
FIG. 12.



Class II. Relative mesio-distal relations of the dental arches abnormal; all the lower teeth occluding distal to normal, producing very marked inharmony in the incisive region and in the facial lines.

Of this class there are two divisions, each having a subdivision. The first division is characterized by a narrowing of the upper arch, lengthened and protruding upper incisors, accompanied by abnormal function of the lips and some form of nasal obstruction and mouth-breathing. (Figs. 8 and 9.)

Fig. 13.



The general characteristics of the first subdivision are the same as in the first division (Fig. 8), only of a less degree, in that one of the lateral halves only is in distal occlusion, the relation of the other lateral half being normal, all as shown in Fig. 10. Patient also a mouth-breather.

The second division (Fig. 11) is characterized by less narrowing of the upper arch, lingual inclination of the upper incisors, and by more or less bunching of the same, as in Fig. 11; and is associated with normal nasal and lip function (Fig. 12).

The peculiarities of this subdivision are similar to those of Division 2, Class II, just described, except that one of the lateral halves only is in distal occlusion, the other lateral half being normal, as in Fig. 13.

Class III. The relation of the jaws is abnormal, all the lower teeth occluding mesial to normal the width of one bicuspid, (Fig. 14), or even more in extreme cases (Fig. 15). The arrangement of the teeth in the arches varies greatly in this class, from that of quite even alignment to considerable bunching and overlapping, especially in the upper arch (Fig. 16). There is usually a lingual inclination of the lower incisors and cuspids,

FIG. 14.

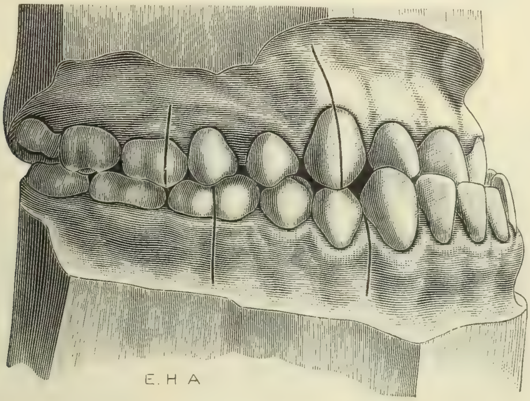


FIG. 15.

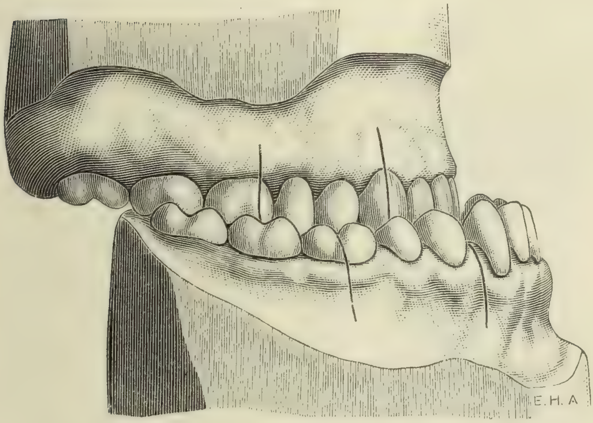
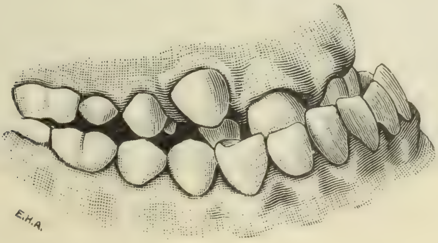


FIG. 16.



which becomes more pronounced as the patient grows older, due to the pressure of the lower lip in the effort to close the mouth.

The inharmony in the size of the arches is usually due to the inharmonious development of the maxillary bones, the angle of the lower jaw being more obtuse than normal; or it may be the result of over-development in the body of the jaw. Occasionally cases are met with where there seems to be over-development in certain localities of the body, as in Fig. 17. Another model in the author's collection shows local over-development of both the lateral halves between the bicuspids, one space being greater than the width of one bicuspid, the other not quite so great.

FIG. 17.

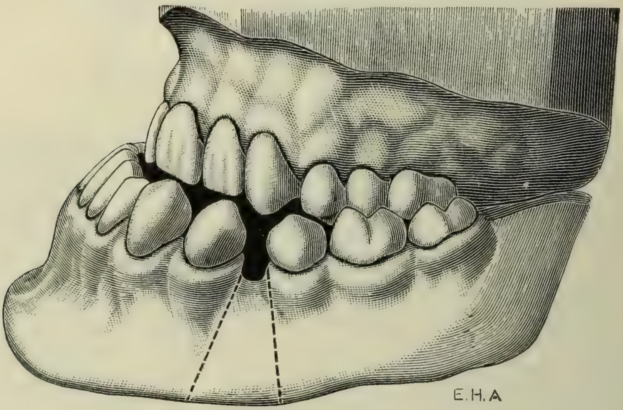
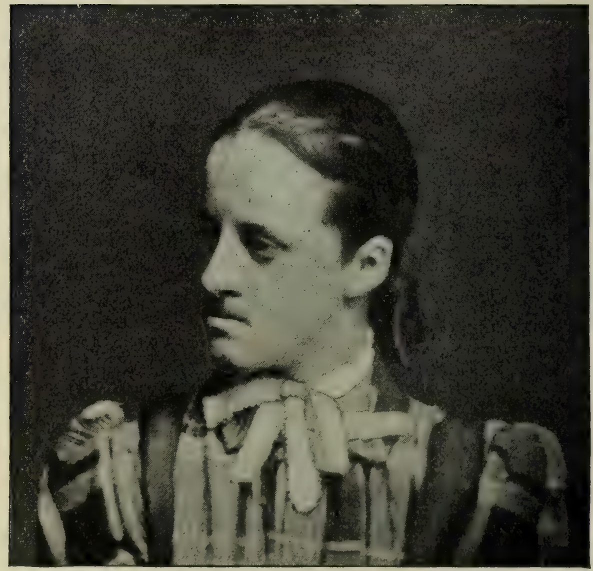


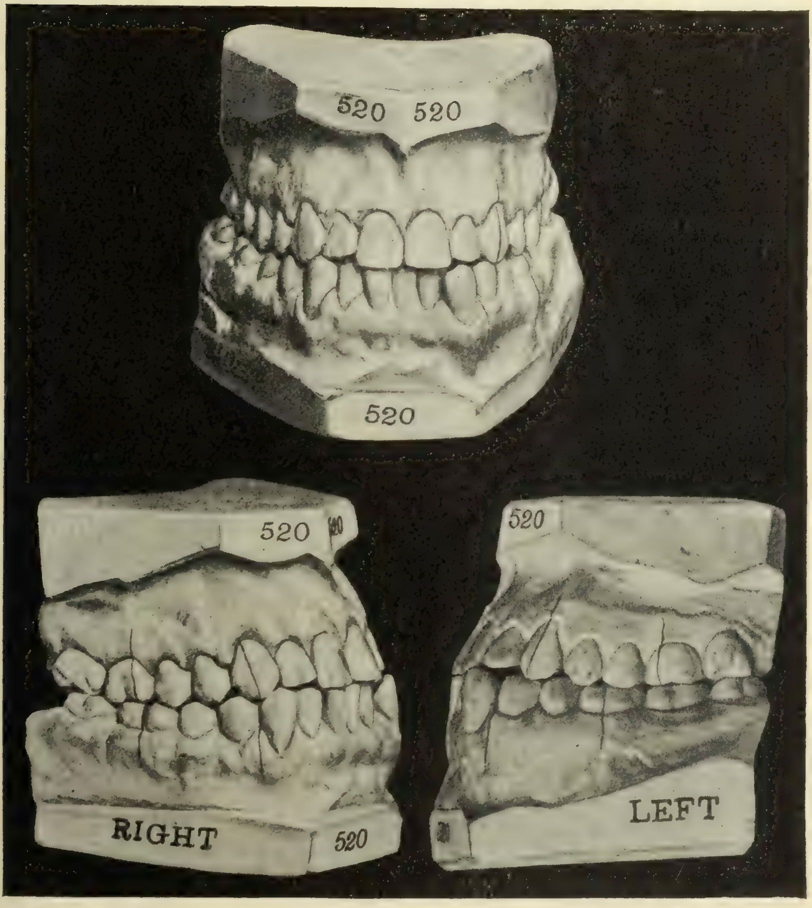
FIG. 18.



In other cases met with the jaw seems to be normal in form, the protrusion apparently being caused by the temporo-maxillary articulation being farther anterior than normal, this probably being due to the gradual sliding forward of the condyles and to modifications of the fossæ.

In all cases of malocclusion belonging to this class the marring of the facial lines is most noticeable, amounting in some instances to most pronounced deformities (Fig. 18).

FIG. 19.



This class also has one subdivision, the general characteristics of which are the same as those of the main class, except that the inharmony is less in degree, in that one of the lateral halves only is in mesial occlusion, the other lateral half being normal, as in Fig. 19.

It is quite probable that all cases met with will be found to be embraced in the above classification. There still remains, however, one possible class,—viz, where one of the lateral halves is in mesial occlusion while the other is in distal, but cases having these characteristics are so rarely met with that no further reference to them is necessary.

In the above classification it will be seen that each of the lateral halves of the arches should be considered as distinctive, yet of equal importance in diagnosis.

Often cases are met with in which a number of the teeth apparently occlude upon the points of the cusps, suggesting at first sight two classes; but upon careful inspection it will be found that a majority of the inclined planes favor either one or the other of these classes.

The loss of a tooth by extraction or otherwise is usually followed by such marked changes in the positions of the remaining teeth that both diagnosis and treatment are greatly complicated. Therefore great care and judgment should be exercised, making allowance for the tipping of teeth and other changes which have taken place as a result of extraction.

CLASS I.

Relative position of the dental arches, mesio-distally, normal, with malocclusions usually confined to the anterior teeth.

CLASS II.

Retrusion of the lower jaw, with distal occlusion of the lower teeth.

Division 1.

a. Narrow upper arch, with lengthened and prominent upper incisors; lack of nasal and lip function. Mouth-breathers.

b. Same as *a,* but with only one lateral half of the arch involved, the other being normal. Mouth-breathers.

Division 2.

a. Slight narrowing of the upper arch; bunching of the upper incisors, with overlapping and lingual inclination; normal lip and nasal function.

b. Same as *a,* but with only one lateral half of the arch involved, the other being normal; normal lip and mouth function.

CLASS III.

a. Protrusion of the lower jaw, with mesial occlusion of the lower teeth; lower incisors and cuspids inclined lingually.

b. Same as *a,* but with only one lateral half of the arch involved, the other being normal.

OUT OF SEVERAL THOUSAND CASES OF MALOCCLUSION EXAMINED THE PROPORTION PER THOUSAND BELONGING TO EACH CLASS WAS AS FOLLOWS:

CLASS I.	692
CLASS II.	
Division 1	90
Subdivision 1	34
Division 2	42
Subdivision 2	100
CLASS III	34
Subdivision	8
	1000

Before entering upon a careful analysis of cases of malocclusion and their diagnosis it will be necessary to consider another important phase of the subject,—namely, the relation of the features to the occlusion of the teeth.

(To be continued.)

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PROCEEDINGS OF SOCIETIES.

UNION MEETING OF THE MARYLAND STATE DENTAL ASSOCIATION, WASHINGTON CITY DENTAL SOCIETY, AND VIRGINIA STATE DENTAL ASSOCIATION.

(Continued from page 967, vol. xl.)

SECOND DAY—*Morning Session.*

THE convention was called to order at ten o'clock; President F. F. Drew, of the Maryland State Dental Association, in the chair.

Dr. W. A. MONTELL, Baltimore, read the following paper:

CALCIC WASTE IN PREGNANCY.

Every dental practitioner has had brought to his attention the old adage, "For every child a tooth," and while attempting during his professional career to combat the fallacy of such a necessity has been forced to admit that during the period mentioned there has usually been a loss of the calcic material of the mother, which has been more or less evinced by the destruction of dental tissues and the impairment of fillings which we have viewed with pride.

In 1887 the writer was led to make some investigation looking to amelioration of these conditions, and submits the results, asking the members to draw their own deductions from the facts submitted. Mrs. T., mother of two children, was under his care for dental services, and stated that she desired nothing permanent done, as in a few months she would be confined and would have to lose one or more teeth before the fulfillment of her time.

The writer combated the idea, and prescribed for her a tablespoonful of lime-water three times a day internally, and an alkaline wash of sodium bicarbonate and water twice a day. The child was safely born, and, like the others, a boy, but, unlike the others, whose temporary teeth were apparently frail, the last one, who has been with the others frequently under the writer's care, had dental organs of a character far superior to the first two, and the mother lost neither a tooth nor filling during the period of gestation.

Mrs. L., whose husband informed the writer that his wife was *enceinte*, was given the same treatment, with similar result. She was the mother of four children previously, all of whom suffered from caries of their deciduous teeth, while the fifth was observed by the writer within the last year, and such teeth as were still retained showed no symptoms of caries, while those which had been removed by the usual physiological process were perfect except the usual absorption of the roots.

Mrs. A., to whose husband the writer suggested the treatment, used syrup of hypophosphites internally, and lime-water as a wash during pregnancy. She is the mother of two children, and shows the loss of dental structure herself, while the children, now four and six years old, have perfect teeth. There are nine more cases of similar results which the writer has carefully recorded, but the data obtained therefrom are not sufficiently complete to give in this paper.

While wishing to allow his professional brethren to draw their own conclusions, the writer wishes to record a few of his own views as deduced from the cases cited,—viz, that undoubtedly there exists a good and sufficient ground to believe that during pregnancy there is an unusual strain upon the system of the mother for the construction and maintenance of the fetus, whose supply of nourishment is derived solely from the maternal source. That during this period the osseous structure of the mother being deprived of its usual pabulum, which is diverted for the purpose of the fetus, the secretions of the body and the condition of the blood are less alkaline than usual, and thus produces the chemical solution of the teeth; for the writer observed that the ravages of the structure of the teeth at this time appear to differ somewhat from the usual phenomena of caries, showing the effects of simple decalcification by acids on extracted teeth. And if the secretions of the various organs are, as we all well know, decidedly acid during this period, there must be a heavy strain and demand upon the system for such calcic constituents as are required during a normal condition; and the results of the writer's observation lead him to believe that we can supply this calcic material in a readily assimilable form through the use of lime-water and kindred preparations, not only preventing the usual loss of dental structure on the part of the mother and replenishing the strain upon her resources, but we can by this method give that foundation for the future dental organs of the fetus so much to be desired.

Discussion.

Dr. G. Lenox Curtis, New York, said that the paper was of interest to all dentists because they were responsible for the condition of the dental organs of their patients; but they are not often in as good a position to give advice as to precautions to be taken as physicians are. The speaker emphasized the necessity of supplying lime to the system, but treatment should go beyond this and build up the whole system and create a healthy state, in which there would be a natural appetite for such foods as contain an abundance of lime-salts. If a supply of lime can be gotten from regular foods, it is better than to administer it as a medicine. When it seemed necessary to prescribe a preparation of lime, he preferred Fellows's hypophosphites, manganese, and iron to build up the system so the required amount of food would be taken and assimilated. He also uses creasote in very minute doses when decay of the children's teeth is taking place; has given it in one-tenth of a drop doses. Dr. Winkler, of New York, suggested this; he says it acts upon the glands and modifies the secretions. It is doubtful whether lime will be assimilated when given in lime-water, but he thinks he has observed improvement in the condition of children when mothers took lime-water during pregnancy.

Dr. H. B. Noble, Washington, said the subject of the paper went to the very foundation of the formation of the teeth. He had always felt that foods containing lime-salts and phosphates were needed to help build up the bony structure of the fetus, but it is uncertain how much of these substances will be assimilated. The best thing is to see that the general health of the mother is kept up to the best possible grade, then the foods containing the substances needed in the bony structures will be efficacious in building up the fetus and keeping the teeth of the mother from being attacked by the acids of the mouth. Dentists have often to give advice on these subjects, and they should be ready to advise proper foods as well as mouth-washes and other remedies.

Dr. R. H. Jones, Wilmington, Del., said that unfortunately dentists were not usually consulted, and often physicians resented advice given by dentists; and, even when they do not resent it, our advice is not usually asked until it is too late. His rule is to advise the use of milk of magnesia to overcome the sensitiveness of the teeth, and he believes that it works beneficially for the fetus as well.

Dr. W. A. Mills, Baltimore, said he did not hesitate to talk to physicians on such subjects, and suggest to them such treatment as seemed to him advisable. He had not found that physicians resented his advice. The prescribing of lime for a woman during pregnancy seems to be proper. The trouble arises from perverted nutrition. The mother cannot furnish the child with the necessary amount of lime except at the expense of her own structure. He had intended to bring to the meetings photographs of three children in one family, two of whom have pinched features, light hair, and poor teeth; the third, who was born after he had the care of the mother, to whom he administered Fellows's hypophosphites and other lime preparations, had full features, dark hair, and strong, perfect teeth. The difference he ascribes to the lime administered to the mother during pregnancy, which built up her system and enabled her to give proper nutrition to the growing child.

Dr. B. J. Cigrand, Chicago, felt that it would be almost presumptuous for him to speak on such a subject, but he could not but feel its importance. The importance is based upon the truism that prevention is better than cure, and if by attention to the mother we can prevent the acid condition in her mouth that causes decay of her teeth, and at the same time insure better teeth for the child, we certainly should give her this attention. During pregnancy the food is likely to contain an excess of sugar, which gives rise to conditions of the mouth specially favorable to the development of bacteria, but which is of little advantage to the mother. It would be better to see that the bacteria were more sparingly supplied and the mother better fed. We know that a tooth is fully builded when it is erupted, and we can do nothing then to strengthen it; but we can do much toward its preservation by neutralizing the secretions of the mouth when they become acid. Unfortunately the subject is not receiving the attention it deserves. Any physician who objects to a dentist giving a mother good advice in regard to such a subject has no right to the claim of being a humanitarian physician.

Dr. MONTELL thanked those present for the consideration given to his paper, and said that usually physicians feel that dentists are justified in prescribing for systemic diseases which affect the organs they especially treat; and if the patient resents such advice given by a dentist, it is usually because the dentist lacks tact in his intercourse with his patients. It should be easy to convince an ordinarily sensible person that such advice is for her own welfare. In reference to hypophosphites, he had confined himself to hypophosphite of calcium, and soda with milk of magnesia for local treatment. He had heard that Fellows's hypophosphites contained strychnia, and therefore he used McArthur's.

Food could be selected containing lime which would be specially adapted to the conditions required in pregnancy. The bones of a man vary in the amount of lime contained, and he thought by the proper control of the food and health the system will be prevented from carrying off from the osseous tissues of the mother the lime needed to build up the bones and teeth of the fetus. Obviously the mother requires a larger amount while the fetus is growing, and this should be supplied. This is a broad field, and deserves more of investigation and research than it has received; and it is an important subject, for we should know how we can protect the mother's teeth during these months of unusual drain and furnish the lime needed for the teeth of the child. Dr. Black says we can do nothing in these directions, but clinical experience teaches us we can do much.

There being no further discussion, Dr. J. GEO. SCHMETZER, of Durham, N. C., read the following paper:

DENTITION AND THE CARE OF DECIDUOUS TEETH.

Dentition is not in itself a morbid process, but a purely physiological act; nevertheless it is usually attended with some degree of suffering. Still, under conditions at all favorable, children with good health and constitutions, the cutting of teeth is performed without unpleasant consequences. It is in this manner that dentition is performed in our domestic animals. However, it very often happens that children experience more or less suffering of a local kind, according to the morbid conditions present.

It appears that a great number of children are born so feeble in constitution that they are not capable of maturing. Many perish during childhood by the various forms of disease common to that period, and many are reduced by bad diet and defective management to a condition which readily yields to pathological processes. Dentition requires a certain amount of energy for its performance; the rapid development of any organ also requires this. Dentition causes an increased flow of blood to the head when the brain is undergoing rapid evolution, sometimes causing cerebral disorders. An increased flow of saliva is usually noticed, though this is not always a certain consequence, for the mouths of infants are usually well supplied with fluids; and, there being no teeth to prevent, it will escape from the mouth. The child is apt to stick its fingers in its mouth, as a little friction seems agreeable to it.

Nature is generally a correct guide, and nothing soothes the infant more and keeps the mouth in better condition than the mother's breast; and, when there is no reason, it should not be withheld.

Every observing practitioner has noticed the local signs,—redness, tumefaction, induration, ulceration, and the whiteness caused by the presenting tooth. At the same time the infant becomes cross, peevish, restless, face flushed, disturbed and broken sleep, incessantly chewing the fingers and thumbs. Such conditions are accounted for on the theory that it is not the pressure of the advancing tooth upon the gums which causes distress, but the resistance of the gums to the eruption of the tooth, and the consequent pressure upon the vessels of nutritive supply. It has been assumed that in such a condition there is produced hyperemia sufficient possibly to cause a protrusion of the pulp mass from the incomplete foramen, which, being pressed upon, causes the pain of which the child gives evidence. This theory is supported by the unmistakable evidence of relief afforded by lancing, and the removal of the tension through a free separation of the overlying integument or capsule of the tooth.

The treatment of first dentition does not often fall upon the dentist, but it should to some extent; and the dentist should know what treatment to advise in the premonitory symptoms of abnormal dentition. Give potassium bromid in three to five-grain doses, according to age. Use soothing lotions of borax and honey. Should diarrhea be prevalent, the attack usually appears with each group of teeth; chalk mixture in combination with camphorated tincture of opium is very serviceable. To abate fever and lessen the irritation of the stomach the following recipe could be used advantageously: Subnitrate of bismuth gr. xii in combination with potassium bromid gr. xv, zinc oxid gr. ii, and pepsin gr. ii. Make four powders; give one every four hours. For acid stomach, milk of magnesia or Husband's magnesia, or a teaspoonful of limewater in the food. In convulsions use chloral hydrate in small doses. Plenty of out-door exercise is essential. If bowels be constipated give mild laxatives, cascara sagrada, tincture rhubarb, or an enema of soap and tepid water. Dentition of children raised upon mixed diets or artificial food is usually retarded. Syphilis, tuberculosis, idiocy, all congenital diseases retard dentition. Many writers upon infantile pathology have always regarded dentition as a potent factor in disease, but the medical authorities of to-day tell us that with the great advancement in the knowledge of the diseases of infancy teething occupies an insignificant position. There is no doubt that some disorders are caused primarily by the evolution of the teeth. (For present purposes we will assume that the birth rate is just the same in winter as in summer; there are just as many babies engaged in growing, cutting, and developing teeth in February as in August. This being the case, we look for as high mortality from the so-called diseases of dentition in winter as in summer, when these diseases are supposed to be at their height.) It is the opinion of the profession that the pronounced disturbances during the heated period are largely due to improper feeding and imperfect management, for it often happens that with the well-to-do, either as a necessity or as a convenience, the mother-fed baby has gone out of fashion, and to-day the bottle-fed baby is largely in evidence. Still teething, like the babies themselves, is a constantly recurring factor, and is a matter of not winter nor summer, but a daily occurrence. The infant body is not an adult organism in miniature; all its organs are incompletely formed; the preponderance of the spinal nervous system is distinctly marked, and it is owing to this fact that the sympathy of distant organs one with another is much greater in infancy than in adult life. It is a matter of common observation that the least functional disorders may cause pronounced disturbances. A little undigested food may cause convulsions, while almost any excitement results in vomiting. With some few children tooth after tooth appears without premonitory symptoms. Dentition comes and goes, attracting attention only when a new tooth appears. Forne remarks that instances of teething such as these are comparatively rare, and can only occur in children who are and have been perfectly healthy, which involves a series of conditions our artificial state of living does not tend to bring about.

Care of the Deciduous Teeth.—The deciduous teeth are usually a much neglected class of organs, and, while I realize that a thoroughly cared for condition is not easily obtained, the greatest difficulty is to get the patient at the right time. Many parents wish to protect their children from the pangs of toothache, but are ignorant as to the proper method of doing so. Children are often brought to the dentist in fear and trembling, and we have to exercise all our tact and skill to avoid giving those dreadful first impressions that are lifelong and do so much to keep the patient from our office. I desire to impress upon those present the importance of saving the deciduous teeth. They should seldom be extracted before or about the time of eruption of the permanent teeth. They usually yield easily to treatment, and with careful attention can be made to do their whole duty. There are operators who take but little interest in children's teeth, and reserve their labor and expense for the permanent set. In operating for children, their confidence should be gained. Amuse them; tell them an interesting story. Should a cavity be very sensitive, it is far preferable to prepare the margins with a soft touch and sharp instruments, leaving the softened dentin in the bottom of the cavity. Sterilize the cavity thoroughly before the filling is put in, and caries will not progress to any extent under the filling. If the pulp has become exposed, destroy it with carbolic acid in preference to extracting the tooth. Do not attempt to fill the roots to their extremes with any solid filling-material. Use cotton or floss silk saturated with a good antiseptic, so that in case of trouble it can be easily removed. In impending trouble pass a small bur through the buccal side of the tooth into the pulp-chamber. In selection of filling-materials gutta-percha is decidedly the best,—the ordinary base-plate variety, on account of its toughness. The margins should be made flush with the borders of the cavity. Oil of eucalyptus will aid you in doing this, as it acts as a solvent and causes the gutta-percha to adhere. In approximal cavities adjacent to each other do not hesitate to bridge the cavities, for the elasticity of the gutta-percha allows this. Oxyphosphate can be used with good results in some cavities. It is claimed that large cavities filled with amalgam appear to retard the normal absorption of the roots. Tin is a good filling-material, but the operation is too tedious for most children to tolerate. The deciduous molar should not be extracted until the first permanent molar has appeared to prevent its coming forward and crowding the other teeth. If you will make models of jaws from which the temporary molars have been extracted, you will find that the permanent teeth are from one-thirty-second to one-quarter of an inch too far forward. If the molars on one side only have been extracted, that one side will be found so while the other remains in position. The two groups of teeth that should receive special attention are the temporary second molars and cuspids, for these teeth remain in the mouth till after the approximating permanent teeth are in position. It is a mistake to try to do the most thorough work for children; better repeat a mild operation at intervals, and retain their confidence by avoiding the infliction of pain unduly.

What I have said of deciduous teeth is not applicable to the permanent set. This paper is intended rather to indicate enough general principles than as an exhaustive essay on the subject.

Dr. Joseph Roach, Baltimore, read the following paper:

DENTITION AND CARE OF DECIDUOUS TEETH.

I mean to make this paper short and direct as to application. Why I place dentition and care of deciduous teeth together is that they are inseparable, for before dentition is completed the deciduous teeth have filled their purpose, and their care or neglect has left its good or baneful effect on their permanent successors. I do not propose discussing the fillings for temporary teeth; they have been so much discussed that we are all familiar with them and their value. My wish is to go to the more simple and more rudimentary thought of how we are to take hold, if I may use such an expression, of the parents of infants and make them understand and undertake the herculean task of seeing that the dentition of their children is looked after as it should be, and that the little pearly gems (for gems they are, of priceless value) are brought through the gums without so much fever, parched gums, and even spasms.

Too often parents do not consult their dentists on this matter at all, but leave it to their family physician, which is not right. It is the duty of every dentist to enlighten parents on their obligation to their little ones; to bring them to us, who have made the mouth a specialty, to let us direct them and to help the little sufferers.

How many of us have children for the first time brought to us when four, five, six, and even ten years old, and how sad we feel on contemplating the injury neglect has done. I am sure that not one of you here but can see, in memory, what I allude to. And the purpose of my paper is to ask you all to join with me in educating the parents to help us in our mission, by understanding and undertaking their part in caring for deciduous teeth.

I see the little ones when they are suffering, examine carefully the gums, and act as circumstances may indicate. I have used with good effect comp. tinc. benzoin and alcohol, equal parts, painting the gums over the erupting tooth. If that fails to relieve the child from pain, I use the lancet.

I find the greatest period of disturbance to be during the eruption of the cuspids. I frequently lance the gums for the cuspids, and the relief is almost like magic. I once lanced the gum over a lower cuspid for a boy fourteen months old, and in a few days was sent for to see the little fellow again. As soon as he saw me he opened his mouth and put his finger over where the other lower cuspid was erupting. I cut the gum freely, and in a few hours his pain and fever had gone.

Now for the hardest part. When the teeth are in the mouth the task of which I first spoke begins, and if faithfully performed the teeth will be well cared for and serve their time. What I mean is for the parents to see that the child's teeth are well and thoroughly cleansed at least twice daily, and, if done, there will be but few cavities for us to fill.

Let me conclude by saying that the object of my paper is to impress us all with the duty we owe our profession in advising the parents and helping the children to the best of our knowledge and ability.

Discussion.

Dr. A. W. SWEENY, Washington, said the subject treated in the two papers was one of such importance as to merit more attention from dentists than it usually receives. It is unfortunately true that bottle-fed babies are more plenty than mother-fed babies. He spoke of bottle-fed babies whose teeth were delayed in eruption, and whose mouth and gums were so sore that they were unable to take the bottle. In such cases local treatment and a change in the manner of feeding would bring relief. There was no artificial food that supplied the needs of the child like the mother's milk.

Dr. B. HOLLY SMITH spoke of the case of a child who had been under the care of a physician, and who was suffering that train of symptoms so frequently met with. Having been asked to examine the child's mouth, he found that the cuspids were impeded in their eruption, and he lanced the gums over the teeth, thus removing the pressure. The relief was sudden and complete, and there was no further need of the physician's care. Some physicians hold that lancing the gums is not necessary; that it is an old-fashioned and barbarous notion, and that nature would take care of the eruption of the teeth, etc. But every dentist and most physicians know how often simply lancing the gums will apparently raise a child from the greatest distress and danger without other treatment.

Dr. DAVID GENESE, Baltimore, spoke of a case of a child whose dentition was very difficult, and when the teeth were erupted they were found to be without enamel and the dentin was very sensitive. He believed the condition pointed to hereditary gout. He always preserves the temporary teeth as long as possible, so as to preserve the arch; he is especially careful to preserve the first permanent molars. When his patients need constitutional treatment for disorders which might affect the teeth he usually prescribed, but always with the consent of the physician. He had not practiced lancing the gums for several years; he did not find it necessary. He used tincture of benzoin locally, and gave attention to the condition of the stomach, which was usually the origin of the trouble.

Dr. Roach said the object of his paper had been to show the necessity of parents consulting dentists about their children's teeth early in the life of the child, so that preservation of the teeth would be possible and children would be early impressed with the necessity of giving attention to their teeth. Thus they would acquire confidence in the dentist, which would do away with the dread of dental operations, which so often deters people from the chair.

Report of Clinics.

Dr. Geo. E. Mulholland, Baltimore, showed a method of electroplating small articles without the use of a battery, using the Pohlman method and fluid. By a perfectly easy and simple process he deposited a coat of gold or silver upon small articles, giving them a beautiful appearance. For dentists' use it seemed to be especially applicable for plating wires and plates used in regulating, etc.

Dr. David Genese, Baltimore, exhibited an acetylene burner adapted to use in a dentist's office when an exceptionally strong light was needed, or for a physician to use when making visits at night, as the lamp is small enough to be easily carried in the pocket.

Dr. F. S. Condit, Chicago, exhibited a combination plate and bridge.

Dr. T. D. Shumway, Plymouth, Mass. Filling of gold and tin by affinity. A union of the two metals by simple contact; no incorporating of one metal into the other. The preparation of the cavity is the same as for an ordinary soft gold foil or tin filling; no undercuts or anchorage points or retaining pits. The tin is first annealed on a piece of mica, and then introduced by the use of hand plugging instruments, such as were in vogue in the days of non-cohesive gold. The pluggers have very shallow serrations. After the tin is thoroughly condensed, and the cavity filled up to nearly the border line of the enamel, the edges are trimmed to conceal the tin. A layer of cohesive gold foil, well annealed (Nos. 2, 3, or 4), of a single thickness, is laid upon the surface of the tin and pressed gently with an ivory instrument. If the conditions necessary for uniting cohesive gold have been obeyed, the union of the gold with the tin will be complete. The remainder of the work is done with very soft but very cohesive gold cylinders and ivory points. After the gold has been introduced, no further attempt at condensation is necessary. The finishing is done with sand-paper and cuttle-fish disks. Burnishing hardens the gold and impairs the union of the two metals. The gold, when the filling is finished, should have the soft appearance of lead. Dr. Shumway says he uses the tin to preserve the teeth and the gold to protect the tin. This gives a filling based upon scientific principles, and recognizing the difference between dentin and enamel. When one puts cohesive gold against the dental fibers and afterward the teeth decay, we think it is because of faulty manipulation, but it is not so, but because the two substances are not compatible. He did not claim to show in his operations superior skill as an operator, but to show the principles which underlie our success if we wish to preserve teeth. This is what we should always strive for, to save teeth. Cutting off teeth and putting on crowns, or putting in bridges, is very nice work for those whose teeth have been neglected, but it is rather the jewelers' work than a branch of the healing art.

Dr. THOS. H. DAVY showed a way of attaching a porcelain-faced Evans gold crown by cement, doing away with soldering. He took an Evans gold crown and, after fitting it to the tooth, cut the face of the crown out. He then selected an artificial tooth of proper size and color, and ground it to fit the vacancy made in the face of the crown. He then backed the tooth with pure gold, No. 33 gauge, having the backing to extend beyond the tooth on all sides. He then placed the tooth and backing carefully in position and backed it with hard wax; then pushed the tooth out and placed a small quantity of plaster on the backing in place of the tooth. After the plaster has hardened for a few minutes he wraps binding wire around it to hold it in position; then solders the backing to the gold crown with 18 or 20-carat gold solder by simply holding it over the gas-flame by pliers grasping the binding wire, which has been twisted to an end. The cusps may be thickened at the same time as thick as desired. The porcelain is then placed back in its place and the crown finished up. Then the porcelain is removed and some thin oxyphosphate cement is placed upon the backing or upon the porcelain, and they are pressed quickly and tightly into place. The pins should be spread or bent to make them secure, or they can be tacked with a particle of soft solder by fluxing and heating with an old excavator; and you will have a crown perfectly strong, neat, and clean.

Dr. S. LUA SYCKES, Cumberland, Md., exhibited a method of anchoring cohesive gold in cement and tin foil. He said by the use of gold with cement, for approximal incisors, cuspids, and crown cavities, you secure the permanency of gold and the preserving qualities of cement. This method does away with the necessity of providing grooves and retaining pits, at which points secondary decay so often occurs; prevents thermal changes, and strengthens and preserves the color of deep cavities with frail walls. Of the method of using gold with tin for crown, buccal, and approximal cavities of bicuspids and molars, he claims the following advantages: A saving of time and energy; no retaining pits to be partially filled; no deep-cut grooves to be bridged over, leaving frail enamel-margin ready to fall, being cut off from the dentin; no crumbling of cervical walls under the mallet. But because of the softness of tin you get a perfect adaptation. Because of its low conductive power you have a more compatible filling, and, besides this, tin has, or is supposed to have, preservative and antiseptic qualities which are valuable. By the cohesion of the gold to the tin guard a perfect, solid filling is obtained, with no slipping off of the gold. The color of the tooth is maintained perfectly, and the gold finish gives all the beauty and indestructible qualities of a gold filling.

Dr. WM. B. FINNEY, Baltimore, showed the Finney method of placing gold tips on the cutting-edges of the anterior teeth, to prevent cracking them when soldering for bridge-work, and to prevent the pressure in biting from cracking or chipping off the porcelain facing; also an original method of attaching bridges and crowns to the teeth by screws which will prevent them loosening or coming off.

Dr. T. S. WATERS, Baltimore, demonstrated Jackson's method of regulating teeth by practical cases undergoing treatment.

Dr. C. L. ALEXANDER, Charlotte, N. C., explained his method of casting gold fillings and bridge abutments. By the aid of carefully prepared models and drawings, he demonstrated that this way of filling teeth, especially where the tooth-structure is badly broken down, secures results which are practical, having strength and a degree of perfection which would be difficult to attain by the ordinary way of filling with gold. Bridge abutments constructed as shown by him have great strength and delicacy, and are so fashioned as to avoid a show of gold, which is so objectionable in bridge-work.

The DENTAL COSMOS of October, 1896, contains an extract of a paper read before the Southern Dental Association by Dr. Alexander on this subject, treating the method somewhat in detail, and accompanied by cuts which illustrate the ideas advanced. The doctor at that time used platinum as a base, but now prefers pure gold for this purpose.

Dr. ALEXANDER also exhibited models and drawings showing a number of original ideas in crown-work. The following description, with cuts, will enable the reader to see some of the advantages claimed for the work:

Fig. 1 represents a porcelain crown having a metal base, and, when perfectly made, is a hygienic as well as a most substantial and esthetic crown. The root to be crowned is ground off level with the gum, and the margin beveled. The porcelain crown is ground to suit the requirements, and then the base is beveled on the lingual and approximal edges. A disk of 24-carat gold, No. 38 gauge, is burnished to the root, and a similar plate of gold is burnished to the base of the porcelain crown. These gold plates are provided with pins and placed in their respective positions upon the root and crown. A little sticky wax placed upon the crown plate will adhere to the root plate when the crown is forced to its position upon the root, thus enabling the removal of these plates from the crown and root, retaining a proper relation to each other. The surplus wax forming their union is trimmed away, and the surface representing the approximal surface is lined with No. 60 gold foil. When the piece is invested the lingual surface is left uncovered. In this way a V-shaped matrix is formed when the wax is melted out, and when filled with gold solder substantially unites the parts.

The base thus obtained is cemented to the porcelain crown and finished up. The crown is then ready to be cemented to its position upon the root. In making the holes for the pins in the molars and bicuspids no effort is made to follow the root-canal; however, special care must always be taken not to drill through the side of the root. One-eighth to three-eighths of an inch will be found deep enough to make these holes for the anchorage pins. An effort will be made to have these crowns manufactured and placed upon the market. The upper molars will be provided with three holes, the lower molars with four, the bicuspids with two, and the anterior teeth with one or more holes, as time proves which is most substantial. This method obviates the necessity of banding the root to gain strength, a practice which should be condemned by every honest dentist for reasons known to all those who have made such collars. Here we depend for strength upon the extra number of pins and the beveled edge, which serves practically the same purpose as a band, either circumferential or intradental.

FIG. 1.

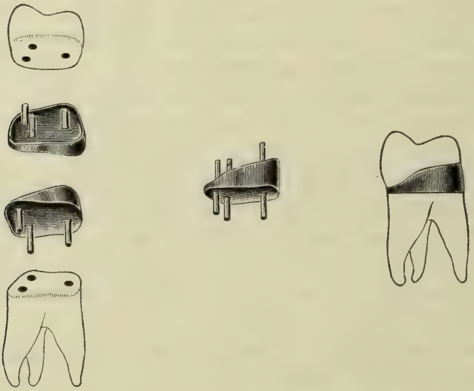


Fig. 2, A, shows a central incisor having a single pin in both the crown and root. B shows a crown provided with three small pins; the root with one large central pin and two small ones, which accomplishes the same purpose as an intradental band. If the case suggests great lateral strain, four of the small pins can be used around the central pin. C shows a crown having four small pins for both the crown and root. D and E show the advantage gained by being able to set any of these crowns at different angles.

Fig. 3, F. Bicuspid having two pins for the crown and two for the root. G, a lower molar having four pins for both the crown and root. H, I, J show an original and perfect method of mounting a Logan crown with a gold joint connection or collar. A 24-carat gold disk rolled very thin is burnished to the base of the crown, and another disk is burnished to the root. The crown, with the gold disk in position upon its base, is provided with a wax disk and then forced to its position upon the root. The crown is now removed, invested, and the two disks united with gold solder. Before investing the surplus wax is trimmed away nicely, and two-thirds of the exposed surface of wax is lined with gold foil, which, with the gold disk, forms a matrix, which is filled with gold solder, thus making the collar.

FIG. 2.

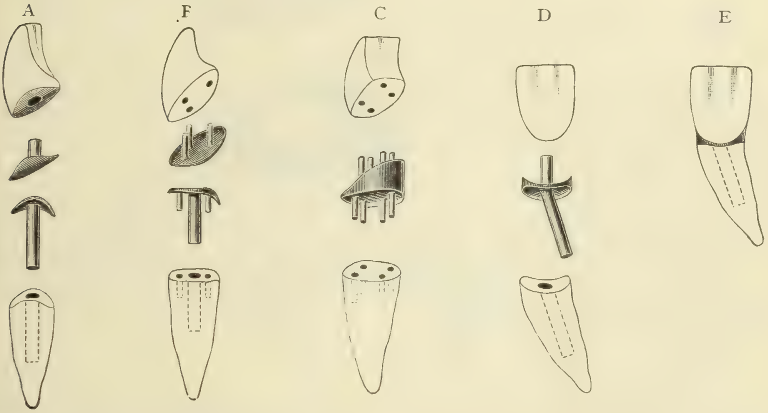


FIG. 3.

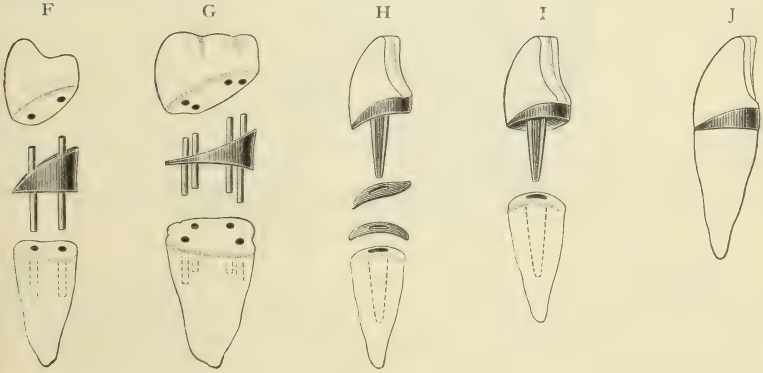
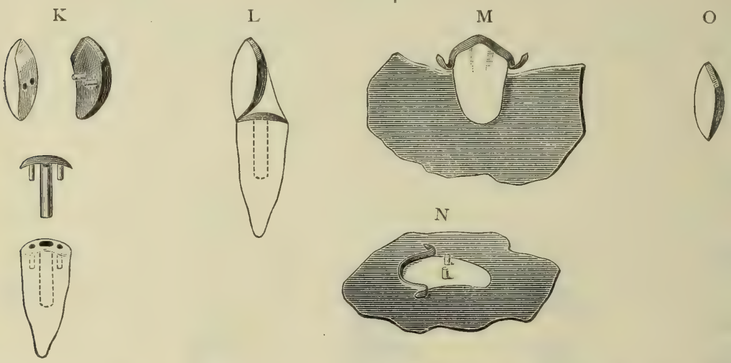


Fig. 4, K, illustrates a porcelain facing for crown- or bridge-work, having holes in the facing instead of pins. The pins are made with the backing, and the facings are cemented to their position after the crown or bridge is finished. Such a facing is well protected by the backing and is not subjected to the fire, therefore the chance of fracture is not so great. M, N, O show a convenient and simple method of reinforcing the cutting-edge of the backings for anterior teeth. The facing is prepared and backed up with pure gold rolled to about No. 40 gauge. The tooth, with the facing in position, is pressed down upon a piece of sheet wax. The wax is then trimmed away from the cutting-edge, and a strip of very thin gold, or No. 60 foil, is placed along this surface. (See M.) When it has been invested and the wax melted away we see result N. After filling in with No. 20 or 22 gold solder and removing from the investment, we get result O.

Fig. 4.



(To be continued.)

THIRTIETH ANNUAL CONVENTION OF THE SIXTH, SEVENTH, AND EIGHTH DISTRICT DENTAL SOCIETIES OF THE STATE OF NEW YORK.

(Continued from page 184.)

SECOND DAY—*Afternoon Session.*

THE convention was called to order at 2.30 P.M., Dr. A. S. Barnes, of Oneonta, in the chair.

Dr. C. W. STAINTON, of Buffalo, read the following paper:

OPEN POSTERIOR BRIDGES.

It is now about two years since I had occasion to make a posterior lower bridge for a person well along in years—over seventy—restoring or replacing the loss of a lower first molar and a second bicuspid.

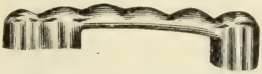
For a score of years this man had been my patient, a most nervous, fanciful one. Many times has he come into my office in great apparent distress, with the current of his existence all awry, because some particle of food was so lodged between his teeth that he could not remove it; or a bit of enamel had been chipped off some tooth, and, to use a phrase of his, he "was in the belly of hell" until the trouble was removed.

I foresaw that the conventional bridge might be very annoying to him if particles of food were difficult to dislodge, or a facing became chipped or broken. After some study I hit upon a new idea. After my model, with crowns in place, was ready I struck up in my die-plate suitable molar and bicuspid cusps of solid gold, fitted and waxed them in place, and, after proper investment, flowed solder wherever I wanted it, joining my cusps and crowns in one piece.

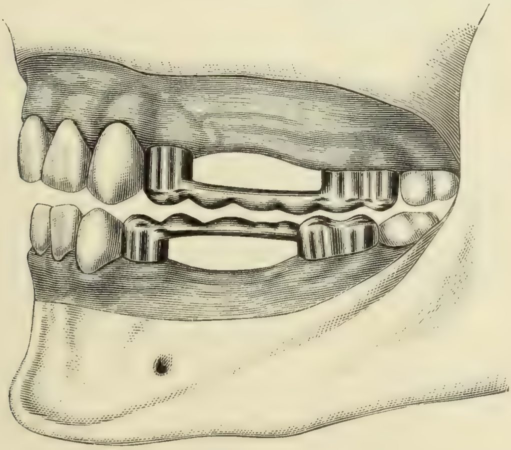
Thus I had my strong biting surface and a space so free under it that no food could lodge there. Indeed, the ease with which the space under and about the bridge was kept clean was more than I had anticipated. My polished crowns and polished under surface of the whole piece made it almost impossible for anything to attach itself anywhere.

It was easier to keep that side of the mouth clean than before the bridge was on.

The success of my experiment was most gratifying to both patient and operator. Never for a moment has my patient been annoyed in any manner. The bridge has been a great comfort in every way. My success in this first trial was so satisfactory that I have put in similar bridges a great many times since then, and have had faith enough in them to have four of them inserted in my own mouth, to my great comfort and satisfaction.



Open Posterior Bridge.



Bridge in situ.

My experience has been such that I feel pretty confident that hereafter I shall not use facings, either of porcelain or gold, in positions out of sight.

What are the advantages?

First. A good deal less work to make the bridge. That of itself is an important item. I do not stop to discuss the question of compensation,—*i.e.*, whether we can charge as much for a thing simply made as for one of more complex manufacture. That should have no control. Our basis of compensation should be the service we render our patient, not how hard it is for us to render that service. Otherwise the more plodding and blundering an operator, the greater should be his compensation. Every dentist gets all he is worth to his patient, or, if he does not, it is his own fault.

Second. Absolute cleanliness and healthfulness of gum-tissue. I have yet to see a case of this sort of bridge when the gum and the necks of the crowned teeth and roots showed irritation. Generally the condition is better than before the insertion of the bridge. Usually when such a bridge is needed there is some mechanical irritation from mastication, but this form of bridge absolutely protects the gum-tissue as well as any form of bridge; while the ease with which all particles of food are swept out by rinsing the mouth makes easy the perfect cleanliness of the parts.

The absolutely disgusting, filthy condition often found under posterior bridges of the common type offers great temptation for the use of superlative adjectives here, but I forbear going into the nauseating details. Every dentist is familiar with the facts.

Third. The exceedingly irritating annoyance of a facing fractured from a molar or bicuspid is avoided. This one fact ought to put all into a receptive state of mind toward the new form of bridge.

As I have said, my faith in this form of bridge led me to have four of them placed in my own mouth. To a brother practitioner, Dr. J. W. Beach, I am indebted for all such service as I could not give in my own case, which means the service until the impression was taken, and the insertion of the completed bridge. These bridges I shall be glad to show you. The shorter ones on the right side were inserted first.

Of these the lower was first made, and in making the upper I made in Melotte's metal a die and counter-die of the bridge in place, and striking up several thicknesses of gold plate, soldering them together, for the floor of my bridge; so that my upper bridge on the right side fits closely the lower one,—that is, a cusp on the lower articulates with a corresponding depression in the upper.

A week or two's experience satisfied me that this was a mistake. The masticating surface was too smooth, and I was aware of the necessity for more muscular power than if cusps were on both bridges.

Accordingly the bridges on the left side present cusps both above and below. We do see cases where the teeth are worn into each other to a perfect articulation, but these are cases usually of great muscular power and where the articulation is such that incisors as well as molars are worn down, "double teeth all around," as their owners fondly call them.

In building a bridge it is desirable to so arrange the cusps that as little muscular force as is needed will be used, as our bridge piers, intended originally for the impact of one crown, must in these cases bear the impact of two or more crowns. Hence too smooth a surface is objectionable.

The drawing will show you in an enlarged form practically the left side of my masticating apparatus. The specimen in brass which I will pass around will give a tangible idea of what such a bridge is.

What is objectionable in this form of bridge, where a bridge cannot be seen?

After quite a little observation and experience, I cannot name an objection that has weight.

It would seem that there would be great objection on the ground of articulation. My first bridge has been worn for two years by a pastor of a church, who is susceptible to the least annoyance in teeth, mouth, or anywhere. I have known him to omit his weekly lecture to his people because I was destroying a pulp; yet he has not been annoyed in the least in his speaking. Precise and particular to a degree, he can see no objection or fault in articulation.

I have yet to have any wearer of these bridges complain of trouble in this direction. In my own case I have not been conscious of any difficulty in speaking or singing. Of the latter I have quite a little to do, and I can see no difference since my four bridges were put in; so I feel quite confident that what would seem like a probable objection in the matter of articulation is in fact no objection.

In my own mouth the only annoyance I have had with food is, when I have bitten a large portion, say of an apple, and a part has dropped between my bridge and the buccal muscles in my cheek, a portion may have caught under the lower or over the upper bridge, so that my tongue has trouble for the moment in removing it. This has happened a few times only, and I speak of it not that it has been a real annoyance, but only a possibility. The general experience is that of ease and facility in cleaning out anything in the way of food or accumulations of any sort.

I had supposed that this form of bridge was original with me. Probably it was; but when I received my copy of *Items of Interest* last February, I saw there an illustrated article entitled "An All-Arch Gold Bridge," by Dr. S. H. Roff, of Cincinnati; practically the same bridge I had been using.

Dr. Roff's bridge springs from the bottom of his piers or crowns, mine from the top nearly. Mine must be easier to keep clean, while the strength of either is abundant. Dr. Roff's experience and mine are similar in this, that the patients are thoroughly pleased with the result. His patient, who had worn several bridges, liked his "All-Arch Gold Bridge" the best of any. My experience is similar.

Discussion.

In answer to questions, Dr. Stainton said that wearing four of these bridges he had no trouble in articulation or interference in speech or singing; that the bridges did not cause any annoyance to the tongue. The bar can be made as thick as desired, and the corners of course should be round. The first one made for his own mouth was too thin at first, but he had made the bar thicker and rounded the edge more, with the result of perfect comfort. He had not found any indication of lack of strength, and the facilities for keeping the bridge clean are admirable.

Dr. J. W. BEACH said he had helped in the construction of the bridge worn by Dr. Stainton, and was convinced that this style of bridge is particularly good for the lower jaw. They can be kept clean so easily that they are quite sanitary. There is one possible objection to this form of denture, and that is that possibly it will not hold the cheek in proper position and fill out the contour of the face as well as a bridge with teeth where this has only the cusps. This objection would be of more consequence in the case of a lady. On the other hand, bridges as usually made are troublesome because they furnish place for the lodgment of food particles, and if they press on the soft tissues they are liable to irritate them. He thought that a bridge to be sanitary should never come into close contact with the gum.

Dr. CHAS. F. HOWELL said he had made similar bridges to those shown by Dr. Stainton some five years ago, but thought in such a wide space it would be better to make the support stronger, let the opening from one pier to the other be rather in the form of an arch.

Dr. F. M. WILLIS thought it much better in constructing a bridge to try as nearly as possible to reproduce the natural teeth,—that is, to make porcelain dummies that will touch the gum and fill up the space. If he should make such a construction as shown by Dr. Stainton he would make the bar twice as thick for added strength.

Dr. F. A. GREENE objected to making porcelain dummies to touch the gum, because if any irritating particle should get between the gum and the bridge the increased pressure of the bridge upon the swollen tissues would aggravate the irritation, and in some cases the swelling would be so great as to necessitate the removal of the bridge. He thought such a bridge as described by the essayist an excellent device, especially for short-bite cases.

Dr. STAINTON, closing the discussion, said the only serious objection to the bridge he had described seemed to be the lack of strength. This he assured his hearers was groundless. In his own experience he had not found food required more force for its mastication than the bridges were able to withstand, while the ease with which they were kept clean was in sharp contrast with the impossibility of cleanliness with bridges which came in contact with the gum.

The subject was passed, and Dr. F. A. GREENE, of Geneva, read the following paper:

CONSERVATISM IN CROWN- AND BRIDGE-WORK.

In choosing the subject for a paper to present to this convention it seemed that a more fitting one could not be chosen than the subject of "Conservatism in Crown- and Bridge-Work," for, as a recent writer has very truly said, crown- and bridge-work is the most used and the most abused of any branch of dentistry; and it is with the hope that some of these abuses, to a certain extent, may be remedied that this feeble attempt is made to call the attention of the profession to the subject, realizing that abuses will go on and on till the end of time. For it must be known that to a great majority of practitioners the large fee that may be exacted from the patient for this class of work is a great temptation, and the men who have any conscience in the transaction are few and far between.

Every student just from college will set himself up as an expert in crown- and bridge-work, and the mess they usually make of it can be testified to by almost any practitioner. In fact, the majority of practitioners do not give the attention to perfecting themselves in this branch of dentistry that they do to the making of a rubber plate, or the putting in of an amalgam filling. They seem to think it is a very simple matter indeed to construct a proper piece of crown- or bridge-work.

We have cities where it is almost impossible to find a patient who will submit to having any of this work put in their mouths, on account of the miserable failures that other patients have experienced from the abuse of the work by so-called specialists. This kind of work will not stand riding as a hobby. A man must be conscientious when he proposes to a patient this class of artificial substitute. He should first consider the case thoroughly, and never propose a case where the chances are not in favor of its success. Of course he will meet cases where, when he has refused to do the work, another dentist has taken the case after him, but in the long run he will secure the confidence of the public and reap his reward by a conscientious adherence to the principle alluded to.

I could name more than one dentist who would give a great deal if he had followed this idea from the beginning, instead of doing the work regardless of conditions, as his life has been made miserable by the work he has been compelled to do over, and the complaints of dissatisfied patients.

The writer affirms, without fear of successful contradiction, that a properly constructed piece of crown- or bridge-work is the most cleanly, most beautiful, and the nearest approach to the natural condition of things of any artificial substitute we have for replacing the natural organs.

Too many men attempt impracticable cases,—*e.g.*, attaching to loose or diseased roots or teeth, bridging too wide spaces, etc.; and it is this dishonest work that leads to the condemnation of bridge-work, and, in many cases, ought to be considered malpractice.

A case that I saw recently was done by a man who bears quite a reputation with the public (not the profession) for this kind of work, and would be a disgrace to any blacksmith. The case extended from the upper left second molar to the cuspid of the same side. There was no articulating tooth below the molar. A crown was made that was large enough to cover the tooth without any grinding whatever. The cuspid was not ground on the sides at all, and in order to have space for the lower teeth, the patient told me when I did the work over that he ground a little groove on each side, and while his assistant held her by main force, he snipped the end off. A full gold crown was then made for the tooth without any other preparation,

I have met many cases of the same class in which there was no preparation of the tooth, and a gold cap was made large enough to go over tooth, bulge and all.

Another case for which the modest fee of seventy-five dollars was charged was a case where the first bicuspid, first and second molars on the lower right side were supported by the second bicuspid, with a vulcanite saddle resting on the gum. And this man had the audacity to tell the patient that the saddle fitted so closely to the gum that nothing could get under it to make it offensive. When I took that case off (the bicuspid was so loose that it came away with the apparatus) the odor that came from it was nauseating.

That case was in less than a year, was never of any use, and it was difficult to induce the patient to have a piece on the other side to supply the second bicuspid and first molar, which has now been in about six years and is doing good service.

About the worst case I have seen was one attached to the root of the upper left cuspid, right second bicuspid, and right second molar, with a saddle of vulcanite on the left side extending from the cuspid attachment to the position of the second molar. The cuspid root had a fistulous opening that was discharging (and had been for more than two years before the case was made, from the evidence of the patient, and the molar was loose when the case was put in). The whole thing was wobbling about, and was most disgusting to look upon and remain in the same room with. Under the vulcanite it was a disgusting sight. Now, gentlemen, this is the kind of dental bridge-work that is causing dentists all over the world to condemn it, and say that it is uncleanly and not the proper thing for the purpose. The question will be asked, What is the proper thing to do? As I said before, a man to do this work successfully must be honest and conscientious, and if he is he will never make any such cases as I have cited.

A proper crown or bridge must be, first of all, cleanly, firm in position, natural in appearance, and do the work to a certain degree of the natural teeth. To meet all of these requirements the work must be well done. A few examples will illustrate what will meet the cases most commonly occurring in every-day practice. We will first consider single crowns.

The writer prefers in all cases to make a special crown for the case in hand, and considers all ready-made crowns, as usually mounted, complete failures. The Logan crown, for instance. It is utterly impossible to make a perfect fit between crown and root by the usual method of grinding, but a beautiful piece of work may be made in the following manner, which is not original with the writer, but suggested by Dr. Gordon White, of Nashville, Tenn.: Prepare the root in the usual manner. Select a proper Logan crown, and bevel the porcelain from the labial surface back so that when it is in place there will be quite a wide V-shaped space between the root and crown. Then remove and place upon the pin of the crown two round disks of very thin and soft platinum, a little larger than the surface of root of tooth, with a disk of quite hard wax between the disks. Then press the crown to place, and the wax will force one disk to a perfect fit on the root and the other one to the crown. Then carefully remove and trim off surplus of wax, and invest for soldering with the thick edge of the disk of wax exposed, remove the wax with boiling water and fill in the space with 22-carat gold, and you will have a piece of work that will be very satisfactory.

The method of making a special crown for each case is quite different. I usually make one by the Downie method. The natural organs are much better imitated than is usually the case with the ready-made crown. For the molars, where the pulp is not exposed, an all-gold crown is preferred. In bridge-work the loss to be replaced is most commonly the bicuspids of the upper and the second bicuspid and first molar of the lower maxilla.

In constructing a dental bridge to supply the place of the bicuspids of the upper maxilla, if the case is in the mouth of a man with a moustache, where exposure of the gold will be no objection, I prefer to band the cuspid and crown the molar with an all-gold crown. And in the case of the molar, if it is one of those cases where the tooth has to be ground very much to make the sides parallel, I prefer to grind the tooth but part way up the sides, and let the crown extend but part way, or not quite to the bulge of the tooth.

In proposing to band the cuspid I am aware that I shall arouse a great deal of criticism, as most men prefer cutting off the cuspid and devitalizing the pulp. But I always feel that a tooth with a live pulp is a much surer foundation than one with the pulp destroyed, and I always explain to the patient the reason for so doing, and that after a few years, if the tooth should decay under the band, the tooth could then be cut off and still have the same conditions as we would have if we should cut the tooth off in the beginning, and thus avoid the danger of trouble for that length of time.

In a woman's mouth I should prefer to cut off the cuspid, or anchor the forward end of the piece in a well-anchored gold filling, as in those cases the gold is a great objection. For the back teeth, where the gold is no objection, I usually make an all-gold piece, as there will be no porcelain facings to break.

A successful dental bridge should not be longer than three teeth, between abutments, and if of that length the abutments should be of the best. The third molar usually is a poor foundation, but cases present themselves where it is necessary to use these teeth. If so the crown should be very carefully fitted, and not go too far under the gum margin, as the tooth makes a very abrupt turn under the margin of the gum, and the gold would begin to leave the tooth beyond that point and act as an irritant and soon destroy the tooth.

So-called saddles, in the opinion of the writer, should never be used, as they are uncleanly and always a source of irritation. All bridge-work should be so constructed that it can be brushed at every point. Bridges so constructed as to fit closely to the gums must sooner or later give trouble, as the conditions are unnatural. Of course this does not cover nearly all of the conditions met with, but will answer as a hint for cases that may present themselves. And a man who understands his business will meet the cases as they come to him; but he must meet them honestly, and work for the best interests of his patient.

Discussion.

Dr. C. W. STAINTON said he would not cap a tooth for a support for a bridge that had a living pulp. He would devitalize it first and avoid trouble in the future.

Dr. S. E. MACDOUGALL indorsed the course advocated in the paper, as he thought one living tooth better than two dead ones. After it decays it can be cut off and a Richmond crown be put on.

Dr. F. M. WILLIS thought it best to preserve the vitality of the tooth, especially if there were several dead teeth in the mouth. In ordinary bridge-work if the gums are in good condition it is better to have the dummies so made as to touch the gum.

Dr. S. ESCHELMAN found it better to remove the pulp and cap the root, as the band will destroy the tooth, because the cement will in time wash out and leave space for lodgment of food particles which will cause decay. Did not favor the use of pivot crowns, except where the mouth was in very good condition and the articulation exceptionally good. Bridge-work, he thought, in the back of the mouth should be made of all gold.

Dr. R. H. HOFHEINZ said that a band crown will preserve a tooth indefinitely if the articulation is perfect, while a pivot tooth will after a while show a space between the crown and the root because the central pivot will have moved.

Dr. GREENE, in closing the discussion, said of course in a matter of crown- or bridge-work the operator must be conscientious and thorough in his work, or he cannot expect to have satisfactory results. When he had a case where it could be done he preferred to get to the cervix of the crown, but where you do not want to cut off the tooth but just let the crown fit down to the bulge you will have a driven fit, and it will hold as long as the life of an ordinary crown or bridge. In regard to bridges touching the gums, he spoke of a case that had come to him recently. The bridge had been worn for three years without trouble, but it was brought to him with the gums swollen above the bridge, which proves that such a construction is dangerous.

In regard to crowns on banded roots, he said there was no better method of crowning a tooth when the band fits perfectly, but not in one case out of one hundred would it fit perfectly. If Dr. Hofheinz bands a root the band will fit, but he could name hundreds of men who do not make their bands fit.

The subject was passed, and Dr. Stainton spoke of the work of the Dental Protective Association and the necessity that exists now for members of the profession, if they would avoid trouble with the Tooth Crown Company, of supporting Dr. Crouse in the work which he has carried on for the last ten years.

(To be continued.)

AMERICAN DENTAL SOCIETY OF EUROPE.

(Continued from page 175.)

FIRST DAY—*Morning Session* (Continued).

DR. L. C. BRYAN read the following paper:

AMERICAN DIPLOMAS IN EUROPE.

MR. CHAIRMAN and fellow-members, at the last meeting of the National Association of Dental Faculties of America a committee was appointed, with Dr. Barrett, of Buffalo, as chairman, to consider what steps had better be taken to raise the status of American degrees and diplomas in Europe, and as a result to obtain, if possible, a mutual recognition of American and European degrees among European and American dental colleges. Soon after the appointment of this committee I entered into correspondence on the subject under discussion with Dr. Barrett, and have also obtained a consensus of opinion from the American dentists in the various countries of Europe as to what action it was advisable to take to reach the desired goal. Since January last, therefore, I have been in constant communication with the most representative men in each country of Europe, with the exception of England, which was assigned to Dr. William Mitchell, and Russia and Austria, in which there are practically no American dentists. From the opinions with which they have favored me I have drawn up a report which will be presented by Dr. Barrett to the National Association of Dental Faculties at its next meeting, to be held in the latter part of the present month. In this report I have outlined a plan of action, as follows:

1. That the National Association of Dental Faculties be advised to appoint a permanent committee to deal with foreign relations, and that through this committee all information regarding dental educational matters should be dealt with, and communication opened with the various governments and dental authorities on the continent of Europe, through the State Department at Washington and the Foreign Examiners.

2. That the National Association of Dental Faculties shall appoint a Board of Foreign Examiners in each country of Europe. These should be composed of well-known dentists, holders of American degrees, who shall have undertaken to thoroughly, conscientiously, and carefully fulfill the duties of their office, and who have the interests of American dentistry at heart. (I have received promises of such acceptance from several gentlemen, should the National Association of Dental Faculties decide to make such

appointments, and the list of members of the American Dental Society of Europe has been forwarded to Dr. Barrett, from which he can make selections.)

It is proposed that the duties of these boards should be: (a) To act as the official representatives of the National Association of Dental Faculties in the country for which they are appointed. (b) To aid the National Association of Dental Faculties in obtaining a mutual recognition of American and European degrees and diplomas by supplying accurate and full information as to the requirements demanded by the dental authorities in the country in which members of the board are resident. (c) To aid in preventing irregular graduations by investigating and reporting any cases brought under their notice, and furnishing definite data of same to the committee of the National Association of Dental Faculties. (d) To examine the certificates presented by applicants for admission to American colleges coming from a country under the jurisdiction of such a board; to determine the true value of such papers, and to ascertain whether the student is sufficiently acquainted with the language to benefit by the lectures of the colleges he proposes to attend. The board would then give each applicant a letter, stating plainly his qualifications, into what class of any college in affiliation with the National Association of Dental Faculties he was entitled to enter, while the deans of all such colleges would be instructed to receive no student applying for admission from a foreign country who was not furnished with such a letter. If a foreign student was already in America, his papers and certificates would be referred to the board for the country from which he came, for examination and report, before he was definitely matriculated. Intending students would be informed that they must obtain this letter from the board of the country from which they came before their application could be entertained.

I have also pointed out in this report that it is important that all negotiations for the recognition of degrees should be carried on through the various American ministers in European countries. European governments will pay no attention to private petitions, but will lend a much readier ear to the official representations of accredited ministers of the American government. To aid the government and ministers in their efforts in this direction, the Department of State at Washington should be furnished with a book giving the names of all the dental colleges in affiliation with the National Association of Dental Faculties and of all those colleges and institutions whose diplomas are worthless. The names of all the colleges should be arranged in three lists, as follows: 1. Those requiring a certain preliminary examination approaching that required in European countries. 2. Those requiring a lower standard of preliminary examination. 3. Those requiring three years and those demanding more than three years' regular attendance at lectures, etc.

This book should be supplied to all American ministers abroad, to enable them to give precise and authoritative information to the various governments to which they are accredited, and these various governments would then accept this information as reliable, owing to its emanating from the Department of State.

*(One of those important things which was neglected, or only gone over casually and dropped, was the matter of the American Dental Society of Europe taking some definite action in regard to protesting against certain illegal institutions in the states of Illinois and Wisconsin, which have been issuing diplomas and flooding the market here with disgraceful representations of something claiming to be an American diploma. We here who have studied and spent years and years gaining our D.D.S. look with a great deal of regret upon such institutions. I have written to Dr. Barrett, who is a member of the committee in America under whose jurisdiction this matter will come, suggesting that the Dental Faculties, through him, should prosecute these institutions, and he tells me it is impossible to get at them. They advertise in Europe, and they send circulars on the Continent, and offer to sell diplomas, and do sell diplomas, and we have definite proof of such diplomas being sold, and it is a disgrace that such things should be.) I have further drawn the attention of the National Association of Dental Faculties to the immense benefit that would accrue to American dentistry at large by the introduction of a federal diploma in America similar to that issued by the Swiss Government. At present individual states can refuse to recognize the degrees granted in other states, and can force the holders to repeat their courses of study in an institution belonging to that state, or to comply with other vexatious regulations. By the establishment of a federal diploma a uniform standard would be required and maintained, and holders of degrees would be enabled to pursue their studies to more advantage, while the immigration of students to states with low standards would naturally cease. Moreover, the governments and dental authorities in Europe would be much more inclined to recognize a federal degree, authorized and issued by the American Government, than to grant reciprocity to those issued by practically private institutions, which may be denied recognition in some states of the Union. It is not necessary that the State Department should hold examinations. It might exchange a federal diploma for that issued by any college of high standard and reputable standing in any state of the Union, or might issue this federal diploma in addition to those men who already possessed such another diploma.

I do most earnestly hope that the National Association of Dental Faculties will at once carefully consider this expression of opinion from their European *confrères*, and take such action as will result, first, in the raising of the standard of preliminary education in America to a high and uniform standard; second, in attaining, through the State Department and ministers abroad, a recognition of American degrees in the various countries of Europe; third, in the suppression, through the offices of the boards of examiners, of those irregular graduations which have been such a disgrace to the profession, in Europe at least, in times past; and fourth (though some may think this should come first), in the establishment of an American federal diploma.

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*The paragraph in parentheses was interpolated by the author after the paper was read.—Ed. Proceedings A. D. S. E.

Finally, I would suggest to this meeting that they should authorize the secretary to write a letter to Dr. Barrett, as chairman of the committee appointed by the National Association of Dental Faculties, expressing their concurrence in the suggested line of action and their hearty co-operation, as a body, in any effort to attain the objects mentioned in the report. This would reach Dr. Barrett in time for presentation to the National Association of Dental Faculties if it were written and dispatched immediately. I would further suggest and do hereby move that a committee be appointed by the American Dental Society of Europe to co-operate with the National Association of Dental Faculties of America in the furtherance of the above objects, and to represent and carry out the wishes of the co-operating societies in this or any other matters coming under the heading of advancement or protection of American dental interests in Europe; and, further, that this committee report at a date during this meeting and present such resolutions as in their judgment would accomplish the desired ends.

Afternoon Session.

Dr. J. LEON WILLIAMS, London, gave a lecture upon the formation and destruction of enamel, embodying the results of his researches on the subject for the past two years. The lecture was fully illustrated by lantern slides.

Following Dr. Williams, Dr. GEORGE CUNNINGHAM, Cambridge, Eng., gave a lantern demonstration of his method of immediate regulation of teeth by surgical procedure.

Dr. RICHTER was then granted a few minutes to speak before the society, and said: I have been for a number of years watching proceedings, and I find that the city of Chicago contains eight institutions which are under the heading of bogus institutions, the city of Milwaukee three, Philadelphia one, Boston one, and the capital of Florida one. They have issued between three and four hundred bogus diplomas in Europe. I am not able to tell you the exact percentage, but I am able to name within the boundaries of Germany almost one hundred persons having either secretly or more or less openly bought diplomas and proclaimed themselves in their advertisements to be American dentists. In Switzerland, in France, and in England the American dentist is an advertising prince, and it is about time it was put a stop to. I have been corresponding with Dr. O'Brian for some time, and if any one has been impressed with the necessity of very positive action on our part, it has been myself and the Society of American-German Graduates, which deputes me to plead their cause before you. It is unfortunate that the state of Illinois enables any one to open an educational institution, although he may know nothing about the subject which he is going to teach. He goes before the Registrar, and takes two fellows along with him, and under the Organization Act they can form a company for the purpose of instructing dental students, and at the same time obtain the right to issue diplomas. Well, they give the diploma first and leave the instruction out, because it is a better paying business, and they go through their courses rather rapidly, so that if you have already your D.D.S. they offer you a Ph.D., and if you are provided with that they tempt you with a professorship. [Laughter.] I had at Brussels the other day the pleasure of seeing four diplomas, one issued by a Milwaukee dental college conferring the title of D.D.S. upon the man, from an academy in Illinois a D.Ph., by the German Medical, of Chicago, an M.D., and then they gave him as a bargain, because he was a good purchaser of these things [laughter], a professorship. The trouble is that the consuls, if applied to by government, will give the information, "Yes, the institution is all right." It is incorporated, but it has not kept up to its laws, for it gives its diplomas to any one who asks. We must furnish the governments here with a list of those institutions considered reputable, and we must, on the other hand, give them a blacklist, making it easy for them to distinguish between the two. I am glad to see Professor Brophy, of Chicago, is with us, because he is the chairman of that organization there, and what we speak to him we speak to the organization, and I am sure we can get his help in putting an end to this shameful traffic. In Germany last year an order was issued that all diplomas issued after May 10, 1897, had to be recognized by the state authorities, if the possessor of the diploma intended to make use of his title in Germany. Regarding those before that date, they were to be left in the same condition as heretofore. That is a weak impression, and the government is beginning to extinguish the titles in Germany seriatim. They have now graduates from Harvard on their list, and the government is beginning to erase them because they write Dr. ———, Dent. They are forbidden by the police authorities to use the title on their sign because they pretend to be Dr. We have a gentleman—Dr. Martin—who was summoned before the court, and others followed, and those who are possessors of the German and American diplomas follow in the second row. It is a regular war of extermination, and to put a stop to it we must take legal proceedings through the only channel which is left open to us,—our government,—and we must apply to the National Association of Dental Faculties, at Omaha, to urge impressively upon the government to provide their ministers with instructions to prove to the German, English, and French authorities that the American D.D.S. stands higher than any other diploma in the world. Now I will read the resolution which I have had brought before me by Dr. Bryan:

WHEREAS, During the last years the great majority of the graduates of American colleges of highest repute practicing in Europe have been treated by European government officials as if possessing one of the worthless parchments bought and sold in the states of Illinois or Wisconsin, both of which states, through the laxity of their incorporation laws, have severally damaged and almost ruined the reputation of the American graduates abroad; be it

Resolved, That the American Association of Dental Faculties should be requested to apply to the Government of the United States for aid and protection herein, by (1) asking the government to furnish through their representatives to the European courts a list of all those colleges whose diplomas are recognized in America as proof of proficiency beyond reproach. (2) That the Association of Faculties shall appoint in each country of Europe one or two representatives, which being those officially recommended by the United States Government to aid the ambassadors of the United States in the execution of this resolution to inform the foreign governments regarding the reputability of American diplomas preferred for recognition. (3) To enter into correspondence with the members of the Senate and Assembly of the states of Illinois and Wisconsin, asking their collaboration in suppressing the infamous diploma swindle carried on in those states, and asking their aid in canceling all diplomas so unlawfully issued.

An American graduate from Harvard handed an application to the Minister of Public Instruction in Berlin, and was refused. That is not a thing which can be left without being attacked. The police will assist in suppressing diplomas if we can prove that they are a fraud, but it can only be done through the instrumentality of the National Association of Dental Faculties, by applying to the government.

Dr. BROPHY. It gives me very much pleasure indeed to meet the members of this association, for this is the first opportunity I have had of doing so. I desire to say that every honest dentist of America hails with delight the advent of this institution. We are glad indeed to see something done to prevent the disgraceful issuing of degrees by the disreputable institutions of our country. I need only relate to you the circumstances of a year ago to show how this is done. There was in Chicago a number of people who came, particularly from Germany, and sought admission to the institution over which I have the honor to preside. One or two could speak a little English, but others were unable to do so. To those who could speak English I made them understand that it would be impossible for us to receive them, as one of the requirements of the college was that all students should have a thorough knowledge of the English language, and must have a good English education, and that they did not fulfill those requirements and consequently could not be admitted. They went away, and I presume Dr. Richter will find them somewhere in his country practicing dentistry with a diploma obtained in the city of Chicago. Now, it is a question for each state to take action. The state of Illinois has such a condition as Dr. Richter has related. Any one may obtain a charter for the establishment of an educational institution; we can't control that. But we are now getting into a better position, for schools of disrepute in America are now marked on our books, and they are not recognized by our institution nor by the state boards of our country, and it will only be a question of a year or two when these schools will be swept out of existence. Illinois has a good many of these schools, because of the defective law under which such institutions are chartered. I, as president of the National Association of Dental College Faculties, will be very glad to carry from you any words you say on this important matter, as the meeting will convene on August 31, in the city of Omaha, when the whole matter will be considered. Professor Barrett is chairman of the committee, and those who have the pleasure of his acquaintance know with what vigor he can take hold of a subject and carry it through. I think of nothing more to say, except that the work must be done through the various states, or it will be impossible to get any action of the United States Government upon the matter.

Dr. BRYAN. Would the state take action upon any representations from this society?

Dr. BROPHY. It would be so much influence.

The SECRETARY. If we circulated this through our journals our American friends might read it, and it would also bring it to the notice of other men in the profession.

Dr. BROPHY. A very good idea indeed.

Dr. RICHTER. There is a Department of Education in Washington, and I think through the Commissioner of Education the Department of State can be reached. If you submit the matter to the Commissioner of Education, asking him to submit it to the Department of State, he is obliged then to take action. I am speaking upon information which the United States Ambassador to Germany has given me. He says that is the legal way.

Dr. BROPHY. I am not thoroughly acquainted with the method of procedure in this matter, but I assure you I will inform myself and take such action as I can. I wish to say that it is a matter of importance to us to get, through the countries from which the students come, evidence of the qualifications of those students. As the head of the Chicago College of Dental Surgery, I receive letters every week from gentlemen in Europe who wish to come over there and study a week or so and then go back to Europe with a degree. I am sorry to say that sometimes they come not from the lower strata, or even from the mediocrity of the profession, and it is a matter of humiliation to me to have to say so. I generally pay no attention to those letters,—they are not worthy of an answer,—for they imply that we encourage illegitimate proceedings, and it will be a matter of great satisfaction to us to have some one in Europe to whom these young men may apply if they want to come to us, and when they do come they should bring proper credentials. It may be amusing to you to know that a man came to me about three years ago with an enormous parchment which had a large seal upon it. I sent him to Dr. Ottofy, who was the secretary of the state society at that time, to translate it, and when the translation came to me I was very much surprised to see that it was to the effect that the holder of it had been duly vaccinated. Well, that was hardly sufficient to admit him to the school. We have now in our country a committee whose duty it is to make reports to such schools of such qualifications as will admit them to our schools. That is a great help, but it would be a greater help if we could get a certificate from the countries from which they come.

Dr. FIELD. Speaking now as an American to an American, I would like to ask Dr. Brophy if the deans and officials of our dental colleges are in sympathy with this movement, or whether they only consider the £, *s.*, *d.*, because without their help and full sympathy we can do nothing.

The SECRETARY. I was present in a dental university, which is a reputable university, the name of which I will not disclose, and heard a German student pass an examination before three professors through an interpreter who had attended the lectures of that university for three years; and as I understood German perfectly, all I can say is that the answers given by the student and the answers which the interpreter gave for him for a good round fee were not alike.

Dr. BROPHY. In answer to Dr. Field, I would say that the National Association of Dental Faculties is heartily in favor of everything which will tend toward an upward grade, and we shall be under many obligations to this association or to any of its members for any information they can give which will aid us in accomplishing exactly the work which has been proposed by Dr. Richter. As to the university which the secretary has mentioned, it would be a proper thing for him to name it, and also the student, if possible. Hearsay evidence of what may have occurred, without knowing the criminal, is of no use, and if I know the particulars I shall carry back some charges against that institution which will be put forth.

Dr. DABOLL complained of a want of uniform method of instruction, but said that a movement in the direction of an improvement in that respect had taken place in America within recent years.

Dr. BROPHY. If it is the pleasure of the society that I should speak again, the standard to which Dr. Daboll has referred was raised in 1864, and it was possible for a man to become a candidate for a degree of dental surgery in six months. Then it became necessary for a student to take a course of two years, and to have this course taken in separate years. And then that method was changed, and with the change from one to two years it became necessary for him to take an examination in the English branches, so that he might be able to pursue his studies in an intelligent manner. Then it was changed from two to three years, and the course was lengthened. Now there is a resolution before the association to be acted upon at the next meeting which provides for a four years' course of nine months each, and the standard is also to be raised. Our advance must be by evolution. It would be impossible for the Americans to go from a low standard to a standard which it would be impossible for many of them to reach all at once. The University of Chicago has adopted the same plan, and every applicant for admission must have what is equivalent to A.B. of Chicago, and I suppose you all know what a high standard that university has adopted. It is not a question of money at all—the question of money is not discussed in the National Association of Dental Faculties. Our object is to elevate the standard as fast and as far as it is possible to do so. I hear a great deal more about the misconduct of my countrymen here than at home, and it is not surprising, because the graduates come here—they don't stay there. They could not possibly enter into practice in the city where they obtain their degree. These schools are blacklisted by the board of examiners, and they could not practice in any other state. There have been over one hundred and fifty arrests made in Chicago for illegal practice. We have a state board which is doing good work in following them up, but then they go somewhere else to practice.

Dr. CUNNINGHAM. With regard to Dr. Bryan's paper, I would submit that it would be a pity when we appoint the officers in this country that any of them should bear the name of examiner, for if you place him in a position in which he has power only as an examiner like the examining board in the place where he lives, it would be a pity to give that man a name and appearance of representing what it really takes a whole corporation to do. We want to uphold the principles which have made American dentistry reputed in the whole world, and we hear that one of the difficulties with which we are face to face comes from America also, and you are discussing points now which apply very little to the federal government of your country, but very much to state government. We find Dr. Brophy representing the education of wise thinking educational men who are desirous of getting over the difficulties of the country in which they live, and we who understand the march and progress of education are proud that you have formed an association which helps you to get over some of those difficulties. At the same time, I don't think you ought to be satisfied with resting upon that alone. Dr. Richter has struck the right note, and a strong note, when he suggests that one government should appeal to another. Dr. Brophy, moreover, has told us that the vote of this body will be accepted by the corporate body in the states, and so it is. The influence of a Cunningham or a Davenport is nothing at all, but when you associate many together and give a strong official character to a body celebrating its twenty-fifth year of its existence, then I think you have a concentrated power which cannot be ignored even in the United States. Don't be afraid or despair, even if the government says, "No, we cannot help you." You have to keep knocking at that door, and if they reply with a *non possumus* we must reply with one to theirs. It is only once a year or once in two years that we can get an opportunity of expressing our collective views, and we should not let that opportunity be missed, but should express our views fearlessly. And at the same time let there be give and take. In this country we are concerned because some have supported an American dentist to get on to the Register here. Those of us who have supported that candidature have nothing to take back, and the Medical Council of this country have thrown it aside. At the same time they have hailed with gratification the fact that certain members of the medical profession, after losing their British nationality, can still remain practicing medicine in Italy, and the *Lancet* and the *British Medical Journal* have hailed that with a certain amount of acclamation. Well, cannot we also say this, that providing a man will submit to a state examination of the country and prove before the board of independent examiners that he is a good dentist, why not let him practice whether he comes from the state of Illinois or the state of Timbuctoo? With regard to the question of details, I should not like to hope too much. There is such a country as Utopia, but none have ever been there or are likely to get there.

I am speaking in the presence of Kaiserliche dentists, but, alas, we have no dental Kaiser. Whilst you appreciate or, I trust, will appreciate what has been done on this occasion, have some sort of consideration and commiseration for those whom you approach. You have to approach the layman, who does not understand this question. He knows a good deal about the bad and the cheap dentistry, but he needs education, and the work which this society might do in that direction would bear fruit in time, and by the time that this society celebrates its jubilee I think we may have found a way of wiping out the painless and plateless gentlemen who intrude upon us so much at this moment.

Dr. WILLIAMS. I have, I think, one practical suggestion to make. I heartily indorse everything which has been said with regard to taking action in America, but what I want to point out is, that so far as we in England are concerned, that would not go a very long way toward getting over the difficulty from which we suffer most, because it is not at all necessary to have any sort of diploma in order to use the term "American dentist" in England. The extent to which we are suffering in England through the lowering of the prestige of American dentists is known only to American dentists practicing in England, and the opinion generally held in England is that American dentistry is not what it is supposed to be, and that change of opinion has come about entirely through men who have absolutely no instruction in dentistry using the designation of "American dentists." Dealers in old clothes can immediately take charge of these institutions run by limited companies, and to my certain knowledge one of these companies is netting between thirty-five and forty thousand dollars a year. That is a small matter, but they are ruining the reputation of American dentistry. I believe that this organization can do much to remedy the damage, and can take some practical steps whilst we are waiting for what Americans can do. Is it not possible to arrange a blacklist? If that could be done, it would be doing more in one blow than in five years in America to get over the outrage upon American dentistry so far as England is concerned, and if it is practicable for the society to take some such steps and give its authority to the promulgation of a blacklist in which these institutions could be named, I think it would be the best step that we could possibly take.

The SECRETARY. Is it advisable from this standpoint: if the Society of American Dentists of Europe issued such a blacklist against any concern practicing in any country, and having permission to do so, could they not bring suits for defamation of character?

Dr. BRYAN. I am delighted to hear the tremendous reverberations that have resulted from what I said this morning, and it shows that the little effort I made last autumn from Davos has borne good fruit, and I think we are now in a condition to do something. There was a general feeling that if we said anything in defamation of the American degree we were calling attention to our weaknesses, but that is our strength, and the National Association of Dental Faculties may do us more good than any organization I know of if we can only impress them with our ideas and supply them with facts that they do not know of. We have already considered the question of examiners which Dr. Cunningham has raised. I used that expression in my correspondence in calling the attention of members on the Continent to the subject, and since I have been at this meeting we have talked the matter over, and I have suggested that instead of using the word "examiner" we had better adopt the words "advisory board." The committee as now organized consists of five members. We have Drs. W. Mitchell and W. E. Royce in England, who are two men who have given great thought and attention to the subject. I represent Switzerland, Dr. O'Brian, Germany, and Dr. I. B. Davenport represents Paris. Any members of the society may make any suggestion to the members of the committee.

The PRESIDENT. Will that committee report at the next meeting?

Dr. BRYAN. It has to report certain resolutions before the final adjournment of this meeting, and then any further necessary discussions can take place at that time.

The SECRETARY. Will the society give the secretary permission to try to insert these articles and discussions in the different organs of our profession in the different countries which we represent?

Dr. BRYAN. I think extracts might be given with advantage.

The PRESIDENT. That can be mentioned when the committee reports.

Dr. BROPHY. In explanation of the position of the dental societies of Chicago about a year ago, the graduates in the Odontographic Society of Chicago and the Odontological Society of Chicago, resolutions condemning these practices were sent to the various dental colleges all over the country, and I presume the secretary of this society received these resolutions.

The SECRETARY. No, I never did.

Dr. BROPHY. Well, they were resolutions condemning these practices, and I make that statement to emphasize what I have already said, that this procedure and these practices are obnoxious to the Americans.

Dr. Brophy and several members tried to get Dr. O'Brian and Dr. Richter to give the names of persons they claimed were practicing under false diplomas and to name the institutions issuing said bogus diplomas, but for some reason these were not forthcoming. Dr. Brophy commented upon the difficulty of contending with these cases where a general and indefinite statement was made without backing it up by specific data.

The society then adjourned to the following day, August 4.

(To be continued.)

SOUTHERN DENTAL ASSOCIATION—BRANCH OF THE NATIONAL DENTAL ASSOCIATION.

THE second annual session of the Southern Dental Association as a branch of the National Dental Association was held at New Orleans, La., February 9, 10, 11, and 13, 1899. The following were elected officers: T. P. Hinman, Atlanta, Ga., president; H. H. Johnson, Macon, Ga., first vice-president; J. P. McDonald, Shelbyville, Tenn., second vice-president; Samuel G. Duff, Greenville, Tex., third vice-president; C. L. Alexander, Charlotte, N. C., corresponding secretary; Sheppard W. Foster, Atlanta, Ga., recording secretary; B. D. Brabson, Knoxville, Tenn., treasurer; A. R. Melendy, Knoxville, Tenn., and J. G. Fife, Dallas, Tex., members of the executive committee.

Adjourned to meet in 1900 at the place to be selected for the meeting of the National Dental Association, one day previous to the meeting of the parent association.

LOUISIANA STATE DENTAL SOCIETY.

THE Louisiana Dental Society held its annual meeting conjointly with the Southern Branch of the National Dental Association, at the Fourth Battalion Armory, New Orleans, February 9, 10, 11, and 13, 1899. The following were elected officers for the ensuing year: L. D. Archinard, New Orleans, president; C. Ratzburg, Shreveport, first vice-president; Wallace Wood, Jr., New Orleans, second vice-president; R. H. Welch, recording secretary; A. L. Brewster, corresponding secretary; J. J. Sarrazin, New Orleans, treasurer; Joseph Bauer, New Orleans, chairman, Chas. Mermilliod, Sr., Lucy, J. M. Comegys, Shreveport, J. Rollo Knapp, New Orleans, C. Ratzburg, Shreveport, executive committee. The following were recommended to the governor for appointment to the Board of Dental Examiners: C. V. Vignes, New Orleans, president; Wallace Wood, Jr., secretary; Chas. Mermilliod, Jr., New Orleans; C. B. Johnston, Monroe, and R. L. Zelenka, Houma.

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DENTAL SOCIETY ANNOUNCEMENTS.

MASSACHUSETTS BOARD OF REGISTRATION IN DENTISTRY.

A MEETING of the Massachusetts Board of Registration in Dentistry, for the examination of candidates, will be held in Boston, Monday, March 20, 1899, at 11.30 A.M., at Boston Dental Infirmary, 563 Tremont street. Examination in operative dentistry at 12 o'clock.

The theoretic examination will be held at State House Civil Service rooms, commencing 9.30 A.M. Tuesday, and will include Anatomy, Physiology, Histology, Chemistry, Pathology, Materia Medica, Operative and Prosthetic Dentistry, Therapeutics, Surgery, Metallurgy, Anesthesia, Orthodontia, Crown- and Bridge-Work.

Each candidate must come prepared with rubber-dam, gold, and instruments, to demonstrate his skill in operative dentistry. Any one who wishes may bring his patient. So far as possible patients will be furnished.

All applications, together with the fee of twenty dollars, must be filed with the secretary of the board on or before March 13, as no application for this meeting will be received after that date.

G. E. MITCHELL, D.D.S., *Secretary*,
25 Merrimack street, Haverhill, Mass.

SOUTHERN WISCONSIN DENTAL ASSOCIATION.

THE Southern Wisconsin Dental Association will hold its fifth annual meeting at Janesville May 3 and 4, 1899. A cordial invitation is extended to the profession.

Officers elected at the last regular meeting are F. S. Knapp, president; Isaac Burton, vice-president; W. G. Hales, treasurer; J. H. Reed, secretary.

J. H. REED, *Secretary*,
Lancaster, Wis.

VERMONT STATE DENTAL SOCIETY.

THE Vermont State Dental Society will hold its twenty-third annual meeting at Burlington, Vt., on March 15-17, 1899. Headquarters at the Van Ness House. A cordial invitation is extended to all members of the profession.

THOMAS MOUND, *Secretary*,
Rutland, Vt.

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EDITORIAL.

CROWDED PAGES.

WE regret, notwithstanding the fact that we have added two extra forms of thirty-two pages to the present issue, several important matters, including book reviews and obituaries, are crowded out, owing to the demands upon our space.

OUR STATE DENTAL LAWS.

WE have for some time past been preparing an epitomized exhibit of the essential features of the dental laws of the several states of the Union, and the result of that work is here appended in tabulated form. While no attempt has been made to furnish an exhaustive *résumé*, the utmost care has been exercised in securing accuracy of result, and we believe the data set forth in the tabulation may be relied upon as being authentic in each case. Copies of all of the state laws were first obtained from the regularly constituted authorities in each case, and after their salient points had been epitomized and printed a proof was sent to the proper officer for his corrections or approval, so that the exhibit as it stands has been fully revised to date by those intrusted with the administration of the dental law in each of the states and territories represented in the list. We have elsewhere called attention to two striking facts* which are clearly shown in the appended exhibit: First, that all but two of the states and territories have laws regulating the practice of dentistry, and, second, that hardly any two of the laws are alike as to their main features.

It is this confusion of state standards of dental requirement which is responsible for our widely varying standards of dental educational requirement, and as a direct consequence of that for the present inability of the practitioner of dentistry in one state to secure legal recognition in all other states without undergoing repeated examinations by state boards.

We submit that the question of the desirability of state dental laws as an abstract proposition has been practically answered in the affirmative by the fact that such laws are now in general force. Hence the problem is no longer one of the desirability of dental legislation, but rather as to its character. The difficulties and injustice arising from the diversity of requirements and standards in our dental laws should be eliminated, and can be if the problem is intelligently dealt with. It is doubtless true that opposition to the elevation of legal dental standards is met with both in and out of the profession in some instances, but all progressive movements have to contend with opposition in some form or other. The main feature to be observed is that the movement shall be essentially righteous, in which case it will gather strength by the very fact that it meets with the opposition which it overcomes.

The unification of our state dental laws is a result which the profession needs and has a right to demand. It is inequitable that the present diversity and confusion exists. We would suggest that a properly constituted committee be appointed by our National body or by the National Association of Dental Examiners to take steps toward securing as rapidly as possible the end noted. The work must necessarily proceed somewhat slowly, but even that will not be an unmixed evil, for it will give both time and opportunity to achieve the best results attainable.

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*The Unification of State Dental Laws. By Edward C. Kirk, D.D.S., *Items of Interest*, February, 1899.

STATE.	YEAR.	AUTHORITY.	HOW APPOINTED.	REQUIREMENTS.	FEES.	FEES AND FINES. WHERE ASSIGNED.	COMPENSATION.	LAW PRINTED IN DENTAL COSMOS.
ALABAMA.	1841, Dec. 31.	Medical Boards.		Same as for license to practice medicine.	No provision.	Fines, half to informer, half to county.	No provision.	
	1881, Feb. 11.	Ex. Board, 5 members State Society.	State Soc.	Dip. or Ex.	L. and Ex., $5; L. on Dip., $5.	Fees to Board; fines to State.	No provision.	Vol. 23, p. 438.
	1887, Feb. 28.	Ex. Board, 5 members State Society. Term, 5 yrs.	State Soc.	Ex.	L., $5. Recording L., $1.	Fees to Board; fines to State.	No provision.	Vol. 29, p. 468.
ARIZONA.	1893, April 3.	Ex. Board, 5 members. Term, 3 yrs.	Governor.	Dip. or Ex.	L. and Ex., $25; L. on Dip., $5; Regist'g L., $2.	Fees to Board; fines to school fund.	No provision.	Vol. 35, p. 1182.
	1895, March 19.			Requiring 2 yrs. previous practice and an Ex. in all branches taught at a Dental College by those without a diploma.				
ARKANSAS.	1887, April 2.	Ex. Board, 5. Term, 4 yrs.	Governor.	Dip.	L. on Dip., $5.	Fees to Board; fines to school fund.	$2.50 per diem and expenses.	Vol. 29, p. 469.
CALIFORNIA.	1885, March 12.	Ex. Board, 7. Term, 4 yrs.	Governor.	Dip. or Ex.	L. and Ex., $10; L. on Dip., $10; Regist'g L., $1.	Fees to Board; fines to school fund.	Expenses.	Vol. 27, p. 503.
	1893, March 3.					Fees to Board; fines, one-half to school fund, one-half to informer.		
COLORADO.	1889, March 15.	Ex. Board, 5.	Governor.	Ex.	L., $10.	Fees to Board; fines to State.	As B'd may deter'e, and exp.	Vol. 31, p. 400.
	1891, April 1.	Ex. Board, 5.	Governor.	Dip. and Ex., or some other State Board Certificate, and Ex.	L., $10.	Fees to Board; fines to State.	As B'd may deter'e, and exp.	
	1897, April 17.	Ex. Board, 5. Term, 2 yrs.	Governor with consent of Senate. 3 names from list furnish'd by State Society.	Dip. and Ex.	L., $10.	Fees to Board; fines to State.	Expenses only.	

STATE.	YEAR.	AUTHORITY.	HOW APPOINTED.	REQUIREMENTS.	FEES.	FEES AND FINES. WHERE ASSIGNED.	COMPENSATION.	LAW PRINTED IN DENTAL COSMOS.
CONNECTICUT.	1887, April 4.	None.		Dip. or any State Board Certificate, or 6 yrs. practice.		Fines to State.		Vol. 29, p 406.
	1893, May 25.	Ex Board, 5 Term, 2 yrs.	Governor.	Dip. and Ex., or 3 yrs. as assistant or pupil to reputable dentist and Ex.; or 3 yrs. continuous practice and Ex.	L. and Ex., $25. $20 returned if can'date fails.	Fees to Board; fines to State.	Expenses only.	Vol. 35, p. 1352.
DELAWARE.	1885, March 31.	Ex. Board, 5.	Governor.	Dip. or Ex.	L. and Ex., $1; L. on Dip., $1.	Fees to Board; fines to school fund.	No provision.	Vol. 27, p. 380.
DISTRICT OF COLUMBIA.	1892, June 6.	Ex. Board, 5. Term, 5 yrs.	District Commissioners.	Dip. or Ex.	L. on Ex., $11; L. on Dip., $10.	Fees to Board; fines to U. S. Treas. for D. C.	Expenses only.	Vol. 34, p. 767.
FLORIDA.	1887, June 7.	Ex. Board, 5. Term, 2 yrs.	Governor.	Ex.	No provision.	Fines to State.	No provision.	Vol. 29 p. 518.
	1891, May 25.	Ex. Board, 5. Term, 2 yrs.	Governor.	Dip. and Ex.	L., $10.	Fees to Board; fines to State.	No provision.	Vol. 33, p. 683.
GEORGIA.	1872, Aug. 24.	Ex. Board, 5 members State Society.	State Soc.	Dip. or Ex.	Ex. no provis'n; L. on Dip., $0.	Fines, half to informer, half to school fund.	No provision.	Vol. 14, p. 628.
	1879, Oct. 20.			Provides for registration, and makes violations misdemeanors.				Vol. 28, p. 52.
	1885, Oct. 9.	Ex. Board, 5 members State Society.	State Soc.	Ex.	No provision.	Fines, half to informer, half to school fund.	No provision.	Vol. 28, p. 52.
	1897, Dec. 15.	Ex. Board, 5. Term, 5 yrs.	Governor, from names furn's'd by State Soc.	Dip., or L. obtained after Ex. from any other State and Ex.	L. and Ex., $10; Regist'g L, 50c.	Fees to Board, any surplus over $300 to sch'l fund; fines to State.	$4 per diem and expenses.	Vol. 40, p. 158.
ILLINOIS.	1881, May 30.	Ex. Board, 5. Term, 5 yrs.	Governor.	Dip. or Ex.	L. and Ex., $2; L. on Dip., $1; Regist'g L, 25c.	Fees to Board; fines to school fund. Except penalty for not registering under 6 mos.	$5 per diem and expenses.	Vol. 23, p. 381.
INDIANA.	1879, March 29.	Ex. Board, 5.	State Soc.	Dip. or Ex.	L. and Ex., $25;	Fees over expenses to State Soc.; fines to school fund.	As by-laws of State Society may provide.	

INDIANA. (Continued.)	1887, March 7.	Ex. Board, 5. Term, 2 yrs.	Gov'r, 1; B'd of Health, 1; State Soc., 3.	Dip. or Ex., and registration.	L. and Ex., $5; L. on Dip., $1; Rec'd'g L., 25c.	Fees to Board; fines to State.	As by-laws of State Society may provide.	Vol. 29, p. 471.
IOWA.	1882, March 2.	Ex Board, 5.	Governor.	Dip. or Ex.	L. and Ex., $2; L. on Dip, $1.	Fees to Board; fines to State.	$5 per diem.	Vol. 24, p. 263.
	1897, Oct. 1.*	Ex. Board, 5. Term, 5 yrs.	Governor.	Dip. or Ex.	L. and Ex., $10; L. on Dip., $2; Yearly renewal of L., $1; Regist'g L, 25c.	Fees to Board; all above compensation and expenses to State; fines to State.	$5 per diem.	
KANSAS.	1885, Feb. 25.	Ex. Board, 4.	Governor.	Dip.	L., $10.	Fees to Board; fines to State	$5 per diem and expenses.	Vol. 27, p. 306.
	1887, March 5.			Extends time of registration under provisions of previous act six months from date.				
	1891, March 9.	Ex. Board, 4. Term, 4 yrs.		Dip. or Ex.	L and Ex., $20; L on Dip., $10	Fees to Board; fines to State.	$5 per diem and expenses.	
KENTUCKY.	1870, Feb. 18.	Act incorporating State Soc. and creating the B'rd of Censors.						
	1878, April 8.	Ex. Board, 3, and Pres. and Sec'y State Soc.	State Soc.	Dip. or Ex.	L. not to exceed $20	Fees over expenses to State Soc.; fines to school fund.	As by-laws of State Soc. may provide.	
	1886, May 10.	Ex. Board, 3, and Pres. and Sec'y State Soc.	State Soc.	Dip. or Ex., and registration.	L. not to exceed $20.	Fees over expenses to State Soc; fines to school fund.	As by-laws of State Soc. may provide.	
	1893, May 1.	Ex. Board, 5. Term as by-laws of State Soc. may prescribe.	State Soc.	Dip. and registration, or Ex. and registration.	L. not to exceed $5.	Fees over expenses to State Soc as a fund for carrying out the law; disposition of fines not given.	Ex. and Com. as by-laws of State Soc. may provide.	
LOUISIANA.	1880, March 10.	Ex. Board, 5 members of State Soc.	State Soc.	Dip. or Ex.	No charge for L. or Ex.	Fines, half to State Society, half to school fund.	No provision.	Vol. 22, p. 208.
	1894, June 26.	Ex. Board, 5 members of State Soc. Term, 2 yrs.	Governor, upon recommendation of State Soc.					

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*Date law went into effect.

STATE.	YEAR.	AUTHORITY.	HOW APPOINTED.	REQUIREMENTS.	FEES.	FEES AND FINES. WHERE ASSIGNED	COMPENSATION.	LAW PRINTED IN DENTAL COSMOS.
MAINE.	1891, March 4.	Ex. Board, 5. Term, 3 yrs.	Governor.	Ex.	L., $20.	Fees to Board; fines to State.	Fees for services, and expenses.	Vol. 33, p. 414.
MARYLAND.	1884, March 31.	Ex. Board, 5.	Governor.	Maryland Dip. or Ex.	L., $1.	Fees to Board; fines to school fund.	No provision.	Vol. 26, p. 373.
	1886, April 7.	Ex. Board, 5. Term, 4 yrs.	Governor.	Dip. or Ex.	L., $1.	Fees to Board; fines to school fund.	No provision.	Vol. 28, p. 661.
	1888.	Incorporated into code of public general laws. No material changes.						
	1896, April 4.	Ex Board, 6. Term, 6 yrs.	Governor, from list furnished by State Soc.	Dip. and Ex., at discretion of Board.	L. and Ex., $10; L. on Dip., $10.	Fees to Board; fines to school fund.	Expenses.	Vol. 38, p. 871.
MASSACHUSETTS.	1887, April 1.	Ex. Board, 5. Term, 3 yrs.	Governor.	Ex.	L., 50 cents; Ex., $10.	Fees to State; fines to State.	$5 per diem, and 3 cts. mileage out of fees.	Vol. 29, p. 407.
	1897, March 23.				Ex. and L. $20.			
MICHIGAN.	1883, June 2.	Ex. Board, 3.	Governor.	Dip. or Ex.	L. and Ex., $10.	Fees over $100 and expenses to State; fines to State.	$3 per diem.	Vol. 25, p. 431.
	1891, July 1.	Ex. Board, 3.	Governor.	Dip. or Ex. Michigan University made the standard college, and prohibition to practice extended to students.	L. and Ex., $10; L. on Dip., $3.	Fees over $100 and expenses to State; fines to State.	$3 per diem.	
	1893, March 10.	Code 1891 re-enacted and provisions made for reports.						
MINNESOTA.	1885, March 3.	Ex. Board 5. At least 3 must be members of State Soc.	Governor, from names furnished by State Soc.	Dip. or Ex.	L. and Ex., $10; L. on Dip., $10.	Fees to Board; fines to school fund.	$5 per diem and expenses.	Vol. 27, p. 378.

MINNESOTA. (Continued.)	1889, April 24.	Ex. Board, 5. At least 3 must be members of State Soc. Term, 3 yrs.	Governor, from names furnished by State Soc.	Dip. and Ex., or 10 years' practice and Ex.	L. and Ex., $10; Annual registration, $1; Registration of L., 50 cents.	Fees to Board ; fines to school fund.	$5 per diem and 3 c. mileage.	Vol. 31, p. 474.
MISSISSIPPI.	1882, Feb. 25.	Ex. Board, 5.	Governor.	Dip. or Ex.	L. and Ex., $5; L. on Dip., $2.	Fees to State Society ; fines to State.	As Society may provide.	Vol. 24, p. 386.
	1890, Feb. 21.	Ex. Board, 5.	Governor.	Ex.	L., $5.	Fees to State Society ; fines to State.	As Society may provide.	Vol. 32, p. 332.
	1892, April 22.	Ex. Board, 5. Term expires with that of Governor.	Governor.	Ex.	L. and Ex., $10.	Fees to Board.	Feesreceivedto be divided.	Vol. 34, p. 949.
MISSOURI.	1883, April 2.	Clerk of County Court. City Register for St. Louis.		Dip.	L., $1.	Fees to Clerk of County Court or City Register ; fines to school fund.		Vol. 25, p. 387.
	1895, June 21.*			Exemption of dentists from jury duty.				Vol. 37, p. 544.
	1897, March 17.	Ex. Board, 5. Term, 5 yrs.	Governor.	Dip. or 3 yrs. study as student in State, or Certificate from examiners of another State.	L. on Dip., $2; L. and Ex., $10; Registering L., 50 cents.	Fees to Board ; fines, one-half to Board, one-half to school fund.	$5 per diem and 3 c. mileage.	
MONTANA.	1895, March 12.	Ex. Board, 5. Term, 5 yrs.	Governor.	Dip. or Ex.	L. on Dip., $10; L. and Ex., $15; Annual Dues, $1.	Fees to Board ; fines to school fund.	$5 per diem and expenses.	Vol. 37, p. 548.
NEBRASKA.	1887, March 23.	Clerk of County Court.		Dip.	L., $1.	Fees to Clerk County Court ; fines to school fund.		Vol. 29, p. 472.
	1895, March 18.	Ex. Board, 3. Term, 3 yrs.	State Board of Health, from list recommended by State Soc.	Dip. or Ex.	L. and Ex., $10; L. on Dip., $2; Regs. with Co. Clerk, $1.	Fees to Board ; fines to State.	Expenses.	
NEVADA.	1895, March 16.	Ex. Board, 5. 3 to be members of State Soc. Term, 4 yrs.	Governor, from names furnished by State Soc.	Dip. or Ex.	L. and Ex., $10; L. on Dip., $10.	Fees to Board ; fines to school fund.	$5 per diem and expenses.	

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*Date law went into effect.

STATE.	YEAR.	AUTHORITY.	HOW APPOINTED.	REQUIREMENTS.	FEES.	FEES AND FINES. WHERE ASSIGNED.	COMPENSATION.	LAW PRINTED IN DENTAL COSMOS.
NEW HAMPSHIRE.	1878, Aug. 6.	Ex. Board, 3 members of State Soc.	State Soc.	Dip. or Ex.	L. and Ex., $5; L. on Dip., $1.	Fees to State Soc.; fines to State	$5 per diem and expenses.	
	1891, April 7.	Ex. Board, 3. Term, 3 yrs.	Governor.	Ex.	L., $5.	Fees to State; fines to State.	$5 per diem and ex. out of fees.	Vol. 33, p. 497.
NEW JERSEY.	1873, March 14.	Ex. Board. 5 members of State Soc.	State Soc.	Dip. or Ex.	L., $30.	Fees to Board; fines, half to informer, half to school fund.	$10 per diem.	—
	1880, Feb. 17.	Ex. Board, 5 members of State Soc.	State Soc.	Dip. or Ex., and Co. registration.	L., $30.	Fees to Board; fines half to informer, half to school fund.	$10 per diem.	Vol. 22, p. 142.
	1884, March 27.	Ex. Board, 5 members of State Soc.	State Soc.	Dip. and Co. registration.	L., $30.	Fees to Board; fines, half to informer, half to school fund.	$10 per diem.	Vol. 26, p. 374.
	1890, April 7.	Ex. Board, 5.	Governor, on recommendation of State Soc.	Dip. and Ex. or 5 years' study and Ex.	L., $25.	Fees to Board; fines, half to Board, half to State.	5 c. mileage and expenses.	Vol. 32, p. 493.
	1894. ——			Amended by striking out clause allowing anyone to ext'ct teeth.				
	1898, March 17.	Ex. Board, 5 Term, 5 yrs.	Governor, on recommendation of State Soc.	Dip. and Ex., or upon recommendation of 5 L. dentists and Ex.	L. and Ex., $25	Fees to Board; fines, one-half to Board, one-half to State.	Expenses and 5 c. mileage.	Vol. 40, p. 408.
NEW MEXICO.	1893, Feb. 23.	Ex. Board, 5. Term, 4 yrs.	Governor.	Dip. or Ex.	L. on Dip., $5; L. and Ex., $25.	Fees to Board; fines to State.	Expenses.	Vol. 35, p. 572.
NEW YORK.	1868, April 7.	Ex. Board, 8.	State Soc.	For State Soc. Diploma, a New York Dip. and Ex., or 4 years' study and Ex., or in practice prior to this act and Ex. No license to practice required.	State Soc. Dip. $20; Cert. of Qualification, $10	Dip. Fee to State Soc; Cert. Fee to District Soc.	No provision.	Vol. 10, p. 296.

New York. (Continued.)	1870, April 21.			For State Soc. Diploma, a New York Dip. and Ex., and State Soc. empowered to confer with Diploma degree of M.D.S.				
	1879, June 21.			For license to practice, Dip. or Ex., and Cert. of Registration.	L. on Ex. (Soc. Dip.), $20; L on Dip. $0; Cert. of Reg. addit'al 50c.	Dip. Fee to State Soc.; Cert. Fee to County Clerk; fines to school fund.	No provision.	
	1881, May 26.			Privilege of registration under provisions of previous act extended 60 days from date.	L. on Ex. (Soc. Dip.), $20; L. on Dip., $0; Cert. of Reg., 25 cents.			Vol. 23, p. 383.
	1888, May 10.			Extends prohibition to practice to employees, and defines more fully methods of registration.	Cert. of Reg., 50 cents.			Vol. 30, p. 608.
	1889, May 31.			Dip. or Ex., and must be 21 years of age, and register.	Cert. of Reg., 50 cents.	Doubles fines for second offense.		Vol. 32, p. 644.
	1892, May 12.					Fines to State Soc.		Vol. 34, p. 946.
	1895, May 12.	Ex. Board, 8. One from each Dist. Term, 4 yrs.	Regents, from list furnished by State Soc.	(1) Must be over 21 yrs. of age. Regents' certf. that a preliminary education equal to a full high school course has been acquired, with Dip. and Ex. (2) May be licensed on proof of license in other State or County where requirements are equal to this State.	L., $25. Reg. with Co. Clerk, $1.	Fees to Regents, any excess above expenses to State Soc. Fines to State Soc.	No provision.	Vol. 37, p. 631.

STATE.	YEAR.	AUTHORITY.	HOW APPOINTED.	REQUIREMENTS.	FEES.	FEES AND FINES. WHERE ASSIGNED.	COMPENSATION.	LAW PRINTED IN DENTAL COSMOS.
New York. (Continued.)	1895. (Continued.)			May be licensed if education and qualifications, with a practice of not less than five years preceding application, is judged equal to the requirements of the State.				
	1896, April 17.			Those admitted for examination must be over 21 yrs. of age; have the general education required pre liminary to receiving the degree of B.M. or M.D., and a graduate of a registered dental school. The last section (2) in above column of law of 1895 still in force. Degree of M.D.S. no longer conferred.				
	1897, April 15.			Refers only to requirements as to preliminary education of those students registered prior to Jan. 1, 1896.				
	1898, April 20.			A licensee of any State granted by Ex. Board which is indorsed by N. Y. State Soc., provided his preliminary and professional ed ucation has not been less than required in this State, may be licensed without examination.				Vol. 40, p. 489.

N. CAROLINA.	1879, March 7.	Ex. Board, 6 members of State Soc.	State Soc.	Dip. or Ex.	No provision.	Fines to school fund.	No provision.	
	1887, March 3.	Ex. Board, 6 members of State Soc.	State Soc.	Dip. or Ex. and registration.	L., $10.	Fees to Board; fines to school fund.	Expenses.	Vol. 29, p. 665.
	1889, Feb. 25.	Ex. Board, 6 members of State Soc.	State Soc.	Time of registration under previous act extended 12 months from date.	L., $10.	Fees to Board; fines to school fund.	Expenses.	
	1891, March 3.	Ex. Board, 6 members of State Soc.	State Soc.	Ex.	L., $10.	Fees to Board; fines to school fund.	Expenses.	
N. DAKOTA.	1885, March 10.	Ex. Board, 5 members of N. and S. Dakota Dental Societies.	Governor.	Dip. or Ex.	L. and Ex., $10; L. on Dip., $10.	Fees to Board; fines to school fund.	$5 per diem and expenses.	Vol. 27, p. 308.
	1890, Feb. 6.	Ex. Board, 5.	Governor.	Dip. or Ex.	Ex, $10; L., $5; Annual Registration, $2.	Fees to Board; fines to school fund.	$5 per diem and and salary to Secretary.	Vol. 32, p. 327.
	1896, Jan. 1.	Ex. Board, 5. Term, 5 yrs.	Governor.	Ex.	Ex., $10; L., $5; Annual Registration, $2.	Fees to Board; fines to State.	$5 per diem and 4c. mileage.	
OHIO.	1868, May 8.	Ex. Board, 5.	State and local Societies.	Dip. or Ex.	No provision.	Fines to school fund.	No provision.	
	1873, March 10.	Ex. Board, 5.	State Soc.	Dip. or Ex.	No provision.	Fines to school fund.	No provision.	
	1892, April 8.	Ex. Board, 5. Term, 3 years.	Governor.	Dip. or Ex.	Ex., $10; L., $2; L. on Dip., $2.	Fees to Board; fines to school fund.	$5 per diem and 3 c. mileage.	
	1894, May 21.			Defining reputable dental colleges.				
OKLAHOMA.	1890, Dec. 25.	Ex. Board, 5.	Governor.	Dip. or Ex.	L., $10.	Fees to Board; fines to school fund.	$3 per diem and expenses.	Vol. 33, p. 1121.
OREGON.	1887, Feb. 23.	Ex. Board, 4. Term, 4 yrs.	Governor.	Dip. or Ex.	Ex., $25; Ex. of Dip., $5; L., $1; Reg. with Co. Clerk, $1.	Fees to Board; fines to school fund.	Expenses.	Vol. 29, p. 473.

STATE.	YEAR.	AUTHORITY.	HOW APPOINTED.	REQUIREMENTS.	FEES.	FEES AND FINES. WHERE ASSIGNED.	COMPENSATION.	LAW PRINTED IN DENTAL COSMOS.
PENNSYLVANIA.	1876, April 17.	Ex. Board, 6.	State Soc.	Dip. or Ex.	L. and Ex., $30.	Fees to Board, any surplus above expenses to State Soc.; fines to poor fund.	Expenses.	Vol. 18, p. 324.
	1883, June 20.			Provides for registration.	L. and Ex., $30; L. on Dip., $0.			Vol. 25, p. 431.
	1893, June 10.			Dip. from College recognized by Nat. Ex. B'd. Ex. will be req'd when necessary.	Ex. and Indorsement of Dip., $5. Indorsement of Dip. $1.	Fees to Board; fines to State.		Vol. 35, p. 571.
	1897, July 9.	Dental Council, 3.—Supt. of Pub. Instruction, Pres. State Board of Health, Pres. State Soc, with Sec'y Med. Council as Sec'y. Ex. Board, 6. Term, 3 yrs.	Governor, from list of members of State Soc. nominated by Soc.	Dip. and Ex. Licensee from another State having requirements equal to this State may be L. without Ex.	L. and Ex., $15; L. given on L. from another State, $10; Reg. with Court Prothonotary, $1.	Fees to Council; fines to State.	Council $100 per year. Ex. Board surplus not exceeding $500 each to be divided pro rata according to ex. held by each.	Vol. 39, p. 681.
RHODE ISLAND.	1888, June 1.	Ex. Board, 5. Term, 3 yrs.	Governor.	Dip. or Ex.	Ex., $25; L., $2.	Fees to Board; fines to State.	Expenses.	Vol. 31, p. 157.
	1897, May 21.			Ex.	Ex., $10; L., $2.			
S. CAROLINA.	1875, Feb. 23.	Ex. Board, 5 members of State Soc.	State Soc.	Dip. or Ex.	L. and Ex, $15; L. on Dip., $0.	Fees to Board; fines to school fund.	No provision.	
	1887, Dec. 19.	Ex. Board, 5 members of State Soc.	State Soc.	Dip. and Ex.	L., $ 5.	Fees to Board; fines to school fund.	No provision.	
S. DAKOTA.	1885, March 10.	Ex. Board. 5 members of State Soc. Term, 5 yrs.	Governor.	Dip. or Ex.	L. and Ex., $10; L. on Dip., $10.	Fees to Board; fines to school fund.	$5 per diem and expenses.	Vol. 27, p. 308.
TENNESSEE.	1891, March 23.	Ex. Board, 6. Term, 3 yrs.	Governor.	Dip. or Ex.	L. and Ex., $10; L. on Dip., $5.	Fees to Board; fines to Board.	$5 per diem and expenses.	Vol. 33, p. 496.

TEXAS.	1889, March 27.	Ex. Board, 3 in each of the 47 judicial districts.	District Judge.	Dip. or Ex.	L. and Ex., $5; L. on Dip., $0.	Fees to Board; fines to school fund.	Expenses.	Vol. 32, p. 331.
	1897, Aug. 19.	Ex. Board, 6. Term, 2 yrs.	Governor.	Dip. or Ex.	L. and Ex., $10; L. on Dip., $10; Recording L. with Co. Clerk, 50 cts.	Fees to Board; fines to school fund.	$5 per diem and necessary expenses.	Vol. 39, p. 875.
UTAH.	1894, March 8.	Ex. Board, 5. Term, 3 yrs.	Governor.	Dip. or Ex.	L. and Ex., $10; L. on Dip., $10; Reg. with Co. Clerk, $1.	Fees to Board; fines to school fund.	Expenses.	Vol. 36, p. 491.
	1898, Jan. 1.*	Ex. Board, 5. Term, 4 yrs.	Governor, with consent of Senate.	Dip. or Ex.	L. and Ex., $5; L. on Dip., $5.	Fees to Board; fines to Board.	Expenses.	
VERMONT.	1882, Nov. 29.	Ex. Board, 5. Term, 2 yrs.	Governor.	Dip. or Ex.	L. and Ex., $5; L. on Dip., $0; Recor'g L. with Sec. of State 25c	Fees over expenses to State; fines to State.	$3 per diem.	Vol. 25, p. 101.
	1896, Nov. 11.				L. and Ex., $5; L. on Dip., $5.			
	1898, Nov. 8.			Ex.	L. and Ex., $10; Recor'g L. with Sec. of State, 25c.		$3 per diem and expenses.	
VIRGINIA.	1886, Feb. 26.	Ex. Board, 6 members of State Soc.	Governor from names furni'd by State Soc.	Dip. or Ex.	L. and Ex., $10.	Fees to Board; fines to school fund.	Expenses.	Vol. 28, p. 449.
	1890, Jan. 28.	Ex. Board, 6. Term, 3 yrs.	Governor, from names furni'd by State Soc.	Dip. and Ex.	L. and Ex., $10.	Fees to Board; fines to school fund.	Expenses.	Vol. 32, p. 748.
	1894, March 2.			Not recognizing foreign Dip. Allowing the granting of temporary L.	Requiring Reg L. with County Clerk, 50c.			Vol. 36, p. 489.
	1898, Feb. 23.			Ex.	L. and Ex., $10; Registration with Co. Clerk 25c.			

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*Revised Code went into effect this date.

STATE.	YEAR.	AUTHORITY.	HOW APPOINTED.	REQUIREMENTS.	FEES.	FEES AND FINES. WHERE ASSIGNED.	COMPENSATION.	LAW PRINTED IN DENTAL COSMOS.
WASHINGTON.	1888, Jan. 28.	Ex. Board, 5.	Governor.	Dip. or Ex.	L. and Ex., $25; L. on Dip., $2.50	Fees to Board; fines to school fund.	$5 per diem and expenses.	Vol. 30, p. 445.
	1893, March 8.	Ex. Board, 5. Term, 2 yrs.	Governor.	Dip. and Ex., or 10 yrs. practice and Ex.	L. and Ex., $25; Reg. with Co. Auditor $1	Fees to Board; fines to school fund.	$5 per diem and expenses.	
WEST VIRGINIA.	1881, Feb. 21.	Ex. Board, 3 for each of the three Congressional districts.	Board of Public Works.	Dip. or Ex.	L. and Ex., $6.	Fees to Board; fines to State.	$2 for each examination.	Vol. 23, p. 219.
	1883, Feb. 22.	Ex. Board, 3 for each of the four Congressional districts.	Board of Public Works.					
	1891.			We are unable to give a synopsis of the law for this year. All laws are superseded by that of 1897.				
	1897, May 21.	Ex. Board, 5. Term, 4 yrs.	Governor.	Ex.	L. and Ex., $10	Fees to Board; fines to school fund.	No provision.	
WISCONSIN.	1885, March 23.	Ex. Board, 5. At least 3 must be members of State Soc.	Governor.	Dip. or Ex.	L. and Ex., $10; L. on Dip., $1; Annual registration, $1.	Fees to Board; fines to State.	Expenses.	Vol. 27, p. 310.
	1887, April 5.	Ex. Board, 5. At least 3 must be members of State Soc. Term, 5 yrs.	Governor.	Dip. or Ex.	L. and Ex., $10; L. on Dip., $1; Annual registration, $1.	Fees to Board; fines to State. Violations defined and made misdemeanors.	Expenses.	
WYOMING.	1893, Feb. 18.	Clerk of Co. where residing.		Dip. recognized by Nat. Board of Dental Examiners. Copy of Dip. to be filed with Co. Clerk.		Fines to school fund.		Vol. 35, p. 487.
HAWAIIAN ISLANDS.	1892, Dec. 19.	Ex. Board, 3. Term, 3 yrs.	Minister of the Interior.	Dip. or Ex.		Fines to State.		Vol. 35, p. 243.

Idaho and Indian Territory are without dental laws.

HINTS, QUERIES, AND COMMENTS.

MUMMIFICATION PASTE.—Into the paste described by Dr. Waas in *Items of Interest,* October, 1898, mix a minute quantity of paraform (polymerized formaldehyd). This is volatile at body temperature, and the gas evolved (formaldehyd) will take care of the space existing between the mummified pulp and the canal walls.

I think this may appeal to those using this method of pulp-treatment.—BERNARD BENNETTE, Birkenhead, Eng.

A MONTHLY BIBLIOGRAPHY OF DENTAL LITERATURE.

COMPILED BY J. MELVIN LAMB, M.D., D.D.S., WASHINGTON, D. C.

The abbreviations of titles used are those common to bibliographical work, and will, it is presumed, be readily comprehended by any one familiar with dental or scientific publications. Any explanation will be gladly furnished by the compiler. A star (*) indicates a thesis.

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LIST OF UNITED STATES PATENTS

PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING JANUARY, 1899.

January 3.—No. 617,025, to Harold M. Joss. Head-rest.
" " No. 617,247, to John A. Gholson. Guard for dental forceps joint.
" *10.*—No. 617,359, to Carl A. R. Samsioe. Alloy for dental purposes.
" " No. 29,996, to Wm. G. Hullhorst. Dental cabinet. (Design.)
" *17.*—No. 617,777, to Carl Tweizer. Dentists' mercury-holder.
" " No. 617,955, to Geo. B. Clement. Alveoli amputating forceps.
" " No. 618,009, to Wm. J. La Varre. Floss-holder for cleaning teeth.
" *24.*—No. 618,105, to Miland A. Knapp. Tooth-regulator.
" " No. 618,324, to Robert Blum. Dental plugger.
" *31.*—No. 618,421, to Israel S. Kirkwood. Dental appliance.
" " No. 618,690, to Adriann Marie Willemter Lagg. Rotary tooth-brush.

THE

DENTAL COSMOS.

VOL. XLI. PHILADELPHIA, APRIL, 1899. No. 4.

ORIGINAL COMMUNICATIONS.

A CONTRIBUTION TO THE BACTERIOLOGY OF THE HUMAN MOUTH.

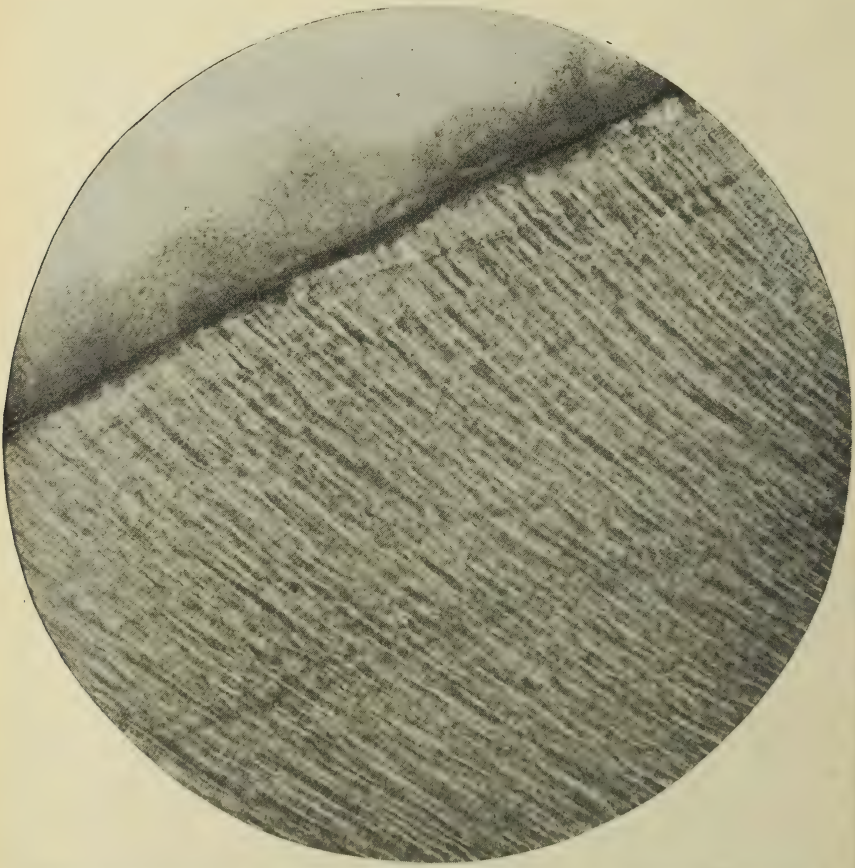
BY J. LEON WILLIAMS, L.D.S., D.D.S., F.R.M.S., LONDON, ENG.

(Read before the New York Odontological Society, January 17, 1899.)

MR. PRESIDENT and Gentlemen of the Odontological Society of New York: In a paper which I read before this society two years ago I made it quite clear, as I thought at the time, that acid-forming micro-organisms which become attached to the enamel of the teeth constitute the sole exciting cause of dental caries. The evidence brought forward in support of this view was, it appeared to me, more complete and conclusive than that upon which most of our accepted scientific generalizations rest. Notwithstanding this, the conclusions reached were challenged by the editor of the *International Dental Journal.* The high position which Dr. Truman has long occupied in our profession and the character and standing of those who are his foremost supporters in the magazine over which he presides made it impossible for me to allow such a challenge to pass unnoticed. In a short article in the DENTAL COSMOS I replied to the more important items in the criticisms put forward by Dr. Truman, but in the August issue of his magazine he has again returned to the attack upon the position taken up by Dr. Black and myself, and in this later article he has either overlooked or ignored some of the more important points which I made in my previous reply. This necessitates my traversing certain ground which I have already covered, but the responsibility for this repetition must not be charged to me.

The substance of all Dr. Truman's criticisms, so far as these criticisms apply to my own work, is, as I understand the matter, as follows: That Leptothrix buccalis has not been demonstrated to be an acid-producing fungus, and that as I have shown only this form attached to the enamel I have not therefore made out my case. He says, "Dr. Williams's original pictures and slides, since seen by the writer, demonstrated that the 'gelatinous microbic plaques,' as Dr. Black calls them, were plentifully distributed, and that they were leptothrix threads *and not the micro-organisms of caries*, hence not acid-producing." An eminent portrait painter, who is, as might be expected, a very close observer and student of human nature, once told me that he had often noticed that men whom he knew to be somewhat timid and uncertain of themselves would almost invariably, in entering a room to meet people with whom they were not familiar, step with an abnormally heavy tread, in a half-unconscious effort to conceal their weakness. When Dr. Truman says, in italics, that the bacteria I have shown attached to the approximal surfaces of teeth are *not the micro-organisms of caries* I cannot help thinking that he is "putting his feet down heavily," with a feeling somewhere in the depths of his conscious-

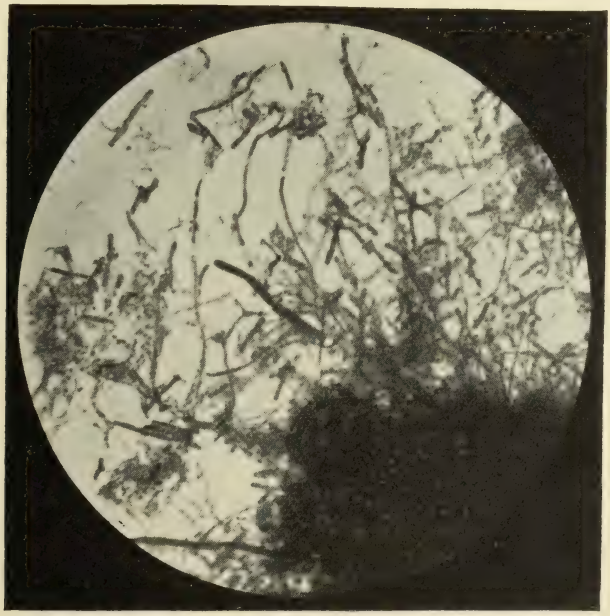
Fig. 1.



Micro-organisms of decay attached to enamel on approximal surface of tooth. From a former paper. Zeiss 12 mm. obj. proj. oc. 3.

ness that he may thereby cover up a possible weakness. Now, I have no desire to make the inevitable retreat unnecessarily difficult for Dr. Truman. In fact, as I know him to be a staunch soldier and a good fighter, I want to see him fighting on the right side, and I will help him into that position in any way that I can. In the statement quoted he had, no doubt, forgotten my caution in the shape of a quotation from Dr. Miller, who says, "We must guard against the very common error of considering every thread-forming organism which occurs in the oral cavity, or is obtained in pure culture from the juices of the mouth, as Leptothrix buccalis, inasmuch as threads are formed by various micro-organisms." Now, the only thing which greatly surprises me is not that Dr. Truman should have assumed that all thread-like micro-organisms found in the mouth are Leptothrix buccalis, but that he should think he could see, in a photograph, *all* the bacterial forms in a gelatinous mass as thick as the thinnest possible section of ground enamel must be, and that he did not, before committing himself to such an emphatic statement, before "putting his feet down so heavily," make the simple experiment of preparing a few cover-glass specimens from these microbic plaques.

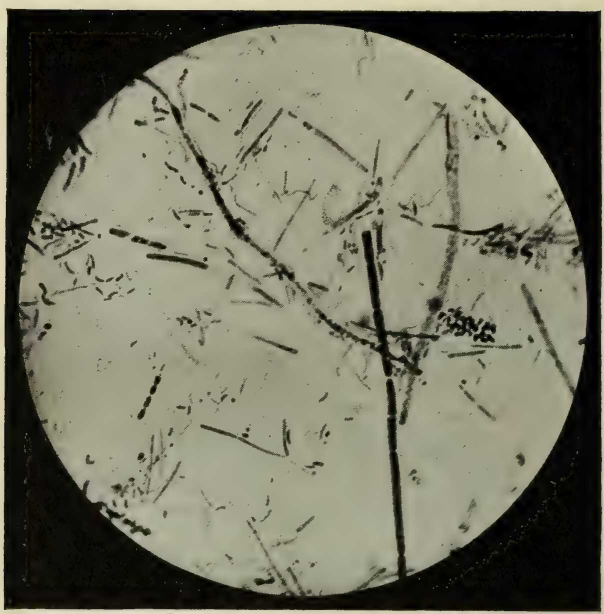
FIG. 2.



A portion of the gelatinous mass of micro-organisms shown in Fig. 1, removed and mounted after cover-glass method. Shows various thread forms and zooglea masses of bacteria and micrococci. Zeiss obj. 3 mm. proj. oc. 3.

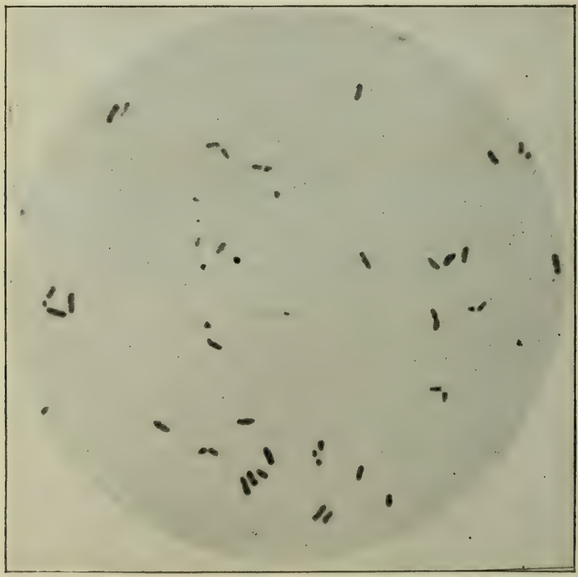
But I am heartily obliged to Dr. Truman for the clear and definite statements which his last criticisms contain. They are precisely what I have been attempting to get for a long time. If

FIG. 3.



From scrapings taken from approximal surface of tooth. Shows all of the typal forms of micro-organisms found in the human mouth, and others which have not heretofore been described. Zeiss obj. 2 mm. proj. oc. 6.

FIG. 4.

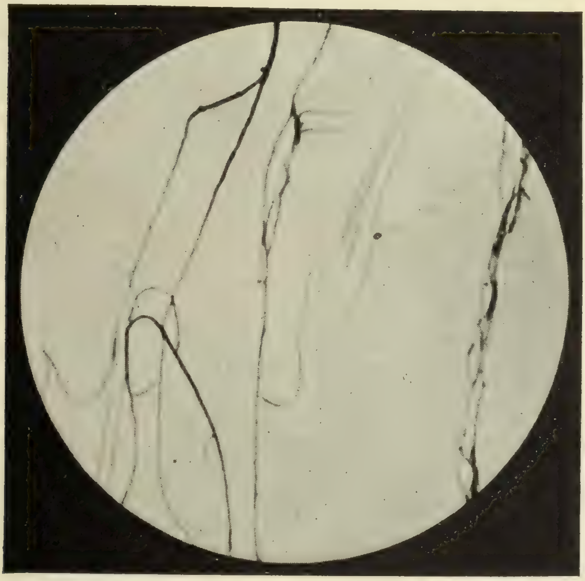


A diphtheroid bacterium grown on agar-agar from same material as the foregoing. Zeiss obj. 2 mm. proj. oc. 6.

they had come sooner we should doubtless have found ourselves in agreement long ago, for no task could be easier than that of pointing out my critic's errors now that they are clearly stated. I assume, you observe, that the able editor of the *International Dental Journal* will become my firm ally when I shall have demonstrated his errors in as clear a manner as he has stated them. First, then, let me call attention to a fact which I supposed every one who is acquainted with the rudiments of oral bacteriology to be familiar with.

So far from Leptothrix buccalis being the only thread-like micro-organism to be found in the human mouth, there are not less than five that are quite common, and probably twice that number could be demonstrated. In this last editorial criticism under consideration Dr. Truman says he has "devoted many years of his life to histological work," and considers himself "quite capable of at least forming an intelligent opinion upon any subject relating thereto." This is undoubtedly true, but an intelligent opinion is not always exactly identical with a critical opinion, and I suppose it is possible that Dr. Truman's many duties may have prevented him from keeping in close critical touch with all of the new special methods of work which have been so rapidly developed in histology and bacteriology during the past few years. When I succeeded in demonstrating the attachment of micro-organisms to the approximal surfaces of teeth it was done by a special method, which made it practically impossible to show at the same time the identity of

FIG. 5.

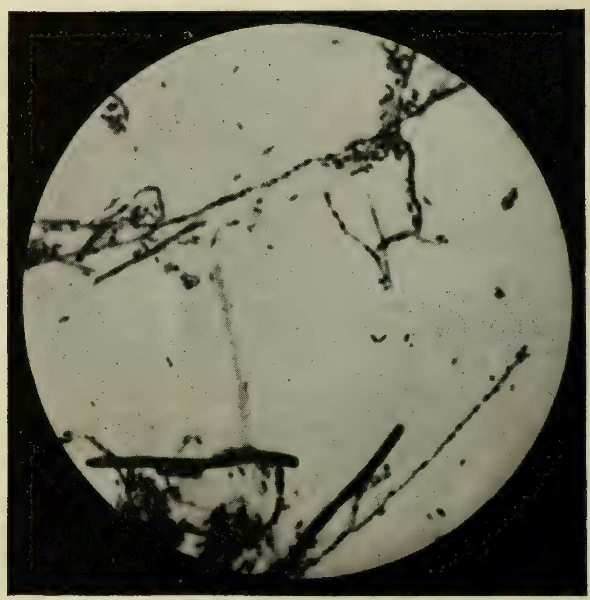


A mycelial micro-organism grown on agar-agar from material taken from scrapings from approximal surface of human tooth. Zeiss obj. 2 mm. proj. oc. 6.

each particular organism. In view of the evidence presented, I confess it never occurred to me that any one familiar with such matters could doubt the conclusions reached. But perhaps I have also to thank Dr. Truman for an opportunity to remove the last lingering doubt on these questions from the minds of many who are perhaps much less capable than himself of forming an intelligent opinion.

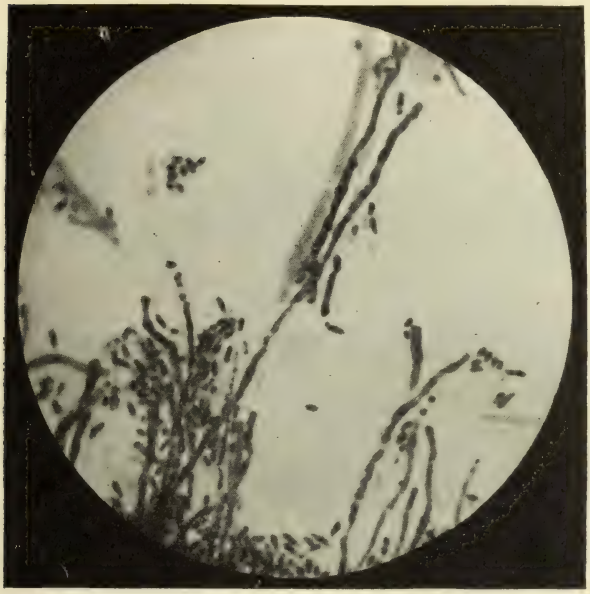
In all of the specimens I have exhibited showing micro-organisms attached to enamel there are not only to be found several thread-like forms beside Leptothrix buccalis, or the Leptothrix innominata of Miller, but there are also always to be found a greater or less variety of other forms imbedded in the gelatinous matrix. Most of the specimens from which my photographs have been made have been mounted in glycerol, and it has been an easy matter therefore for me to take some of the very specimens from which these photographs were made and, dismounting them and washing out the glycerol, to remove the micro-organisms and make a special cover-glass preparation of them so as to demonstrate their individuality. This I have done in several instances. Fig. 1 shows one of the specimens used for a former paper, while Fig. 2 is from a cover-glass preparation made from the scrapings taken from the specimen shown in Fig. 1. It contains, you will observe, several thread forms, large and small bacteria, short and

Fig. 6.



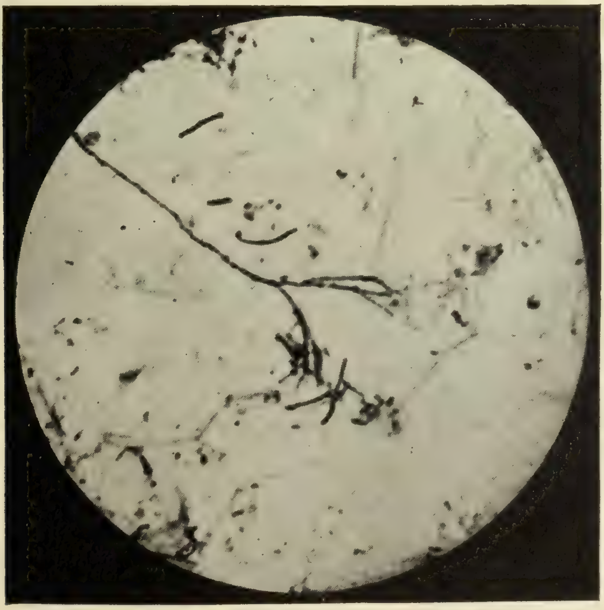
A new thread form of micro-organism. Stained by hot Gram method and counterstained with methylen blue. Spore-like bodies show deep purple, and other parts of thread blue. Zeiss obj. 3 mm. proj. oc. 6.

FIG. 7.



Showing enlargement of growing ends of the new thread-like organism. The protoplasm stains more quickly and deeply than in the lower parts of the thread. Zeiss obj. 2 mm. proj. oc. 6.

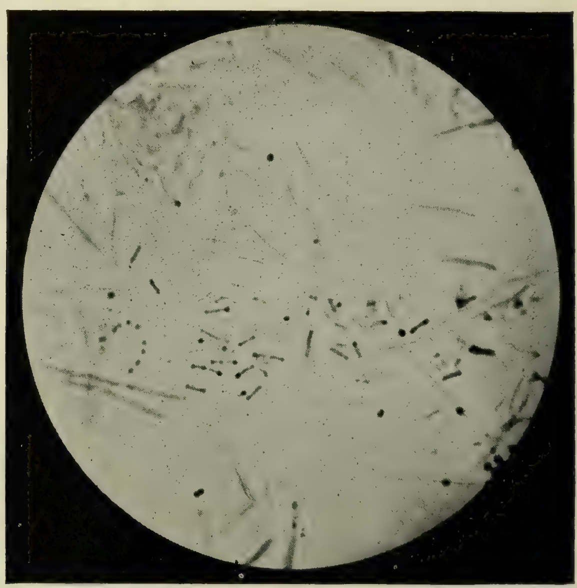
FIG. 8.



Showing branching of new thread-like organism. The branches are seen to arise from the spore-like bodies.

long rod forms, and zooglea masses of micrococci. I may mention, in passing, that every photograph used in the illustration of this paper has been taken from specimens made from the microbic plaques found attached to the enamel. Fig. 3 is from such a preparation, and might well be called a photographic chart of the bacteria of the mouth, showing as it does more than a dozen forms which have been catalogued as distinct species and containing all of the typal forms. Epithelial cells are not infrequently found so firmly imbedded in those gelatinous masses as to require considerable teasing to get them out. It is not surprising, therefore, to find that they are not easily dislodged from their positions.

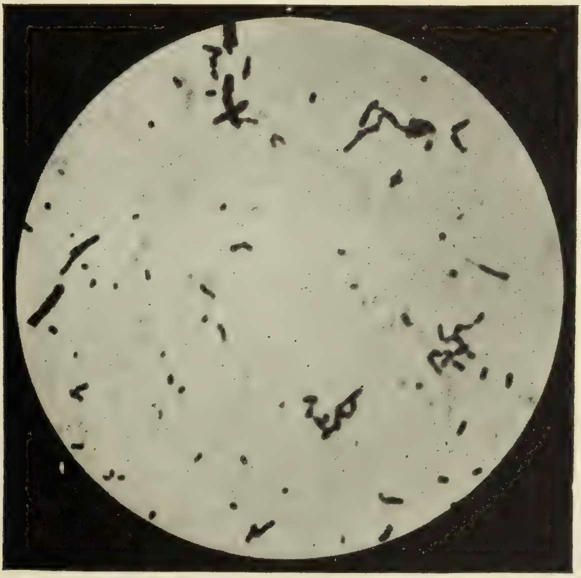
FIG. 9.



Shows possible commencement of growth of new thread-like organism.

Inasmuch as it is generally known among bacteriologists that many, probably a large majority, of the bacteria shown in the foregoing illustrations are, under certain circumstances, acid-producers, I should be well within the limits of a complete demonstration if I rested my case here, but for the credit of the general intelligence of our profession I am desirous of seeing these questions entirely settled to the minds of all; and I have therefore undertaken to isolate by cultivation some of the forms most frequently found in the microbic plaques of the approximal surfaces of teeth and to test them with reference to their acid-producing functions. This work is still in progress, and will probably occupy such time as I can give to it for many months. Up to the present I have only been able to test three forms. Two of these, Staphylococcus pyogenes albus and Staphylococcus pyogenes aureus, are forms which I should least have suspected to be concerned in the production of the acid of decay, and they show very marked powers in this direction. I incline to the opinion that these two forms are to be found in a much larger percentage of mouths than the records of some of those who have studied this subject would indicate. If they are not found to develop in the first effort at making cultures from a mouth, it should not be concluded that they are not present. I have discovered both forms in mouths where I could find no trace of suppuration, and where all the conditions seemed normal and healthy. In the studies made for this paper I found both forms in first cultures of four out of the first six mouths examined. I am therefore disposed to agree with Dr. Black in the opinion that they might be discovered in almost all mouths if sought for with sufficient care. The only other form tested up to the time of writing these lines is Sarcina lutea, which gave no acid reaction after forty-eight hours, but showed considerable after remaining seven days in the warm chamber. The following table shows the percentage of acid as the result of three separate examinations:*

FIG. 10.



Nearly pure growth of diphtheroid organism from approximal surface of tooth. Zeiss obj. 2 mm. proj. oc. 6.

	After 48 hours.	After 3 days.	After 7 days.
Staphylococcus pyog. albus	0.058	0.063	0.067
" " aureus	0.090	0.092	0.112
Sarcina lutea	0.000	0.000	0.031

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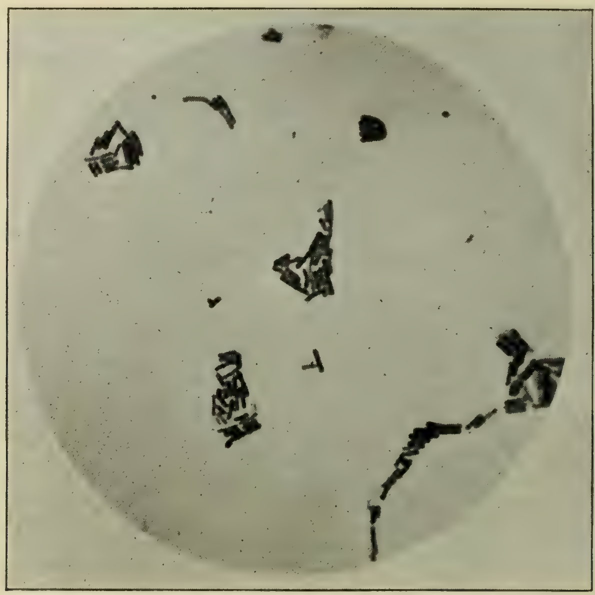
*In this experiment I have had the kind assistance of Mr. R. F. Wood Smith.

Blank control flasks were used in all of the tests which remained entirely neutral. The above experiments are chiefly interesting as giving another demonstration that micro-organisms which are usually found in a fluid giving an alkaline reaction may, when grown in a different nutrient medium, yield an acid reaction. All of the reactions mentioned were from cultures grown in beef broth containing one per cent. of glucose. From facts now in our possession it seems highly probable that an exhaustive examination of cultures of the micro-organisms of the human mouth would show that most, if not all of them, will give an acid reaction when grown in certain media, although some of them may give an alkaline reaction when grown in other media. A verification of this opinion would go far toward explaining the observed fluctuations in the progress of caries as seen clinically and also shown in microscopic specimens.

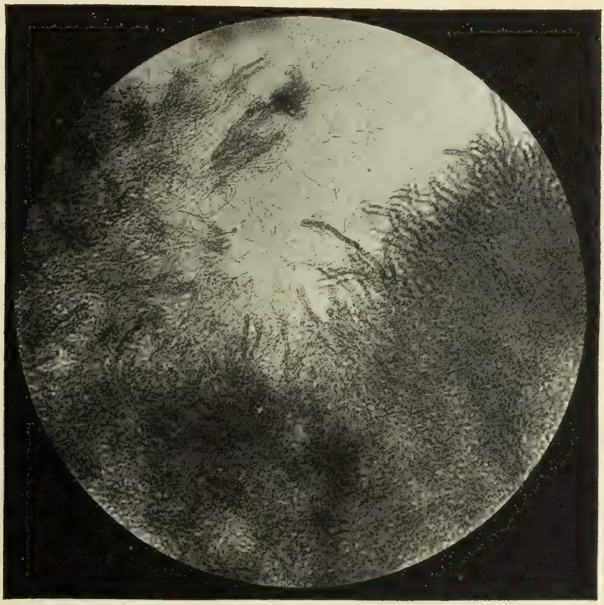
FIG. 11.



Pure growth of bacteria from approximal surface of tooth. The peculiar arrangement in this and the preceding specimen is supposed to be characteristic of diphtheroid organisms.

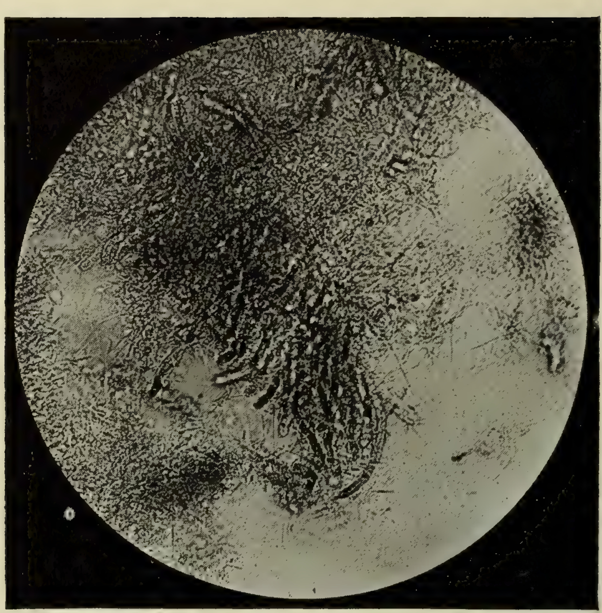
In addition to several other forms isolated, but not yet tested as to their acid-producing functions (see Fig. 4), I have found organisms of a diphtheroid character present in a large majority of mouths examined, and often where there has been no history of diphtheria. Some of the specimens distinctly show the cross-markings of the Löffler bacillus. I have also isolated a very strong growing mycelial organism which develops rapidly at the normal mouth temperature, and shows large round colonies, bluish-gray in the center, and with white margins. This organism strongly resembles actinomyces, but whereas the latter requires ten to fourteen days to develop a well-grown colony, the new organism is well grown in forty-eight hours. (See Fig. 5.) It branches freely, and the shorter branches are sometimes club-shaped,—*i.e.*, largest at the growing end,—and when broken off from the parent stem strongly resemble diphtheroid bacteria. It is well known that the bacilli of diphtheria and of tubercle are very unstable in their forms, and it is conjectured that both represent a degenerate phase of mycelial fungi. Further search for this interesting organism will be made, and, if found, a close study given to it. In addition to the foregoing I have found a thread form, not previously described so far as I am aware, to be fairly constant in the mouths I have examined, but I have not yet succeeded in cultivating it. Stained in the usual way with any of the anilin dyes, it might easily pass for Leptothrix buccalis. But by staining for eight to ten minutes in hot anilin-gentian-violet and fixing in hot iodid solution à la Gram, then washing for two minutes in absolute alcohol, followed by distilled water, and counterstaining in methylen blue, a totally different structure is revealed. (See Fig. 6.) The threads are seen to be composed of long and short segments, or cells, each

FIG. 12.



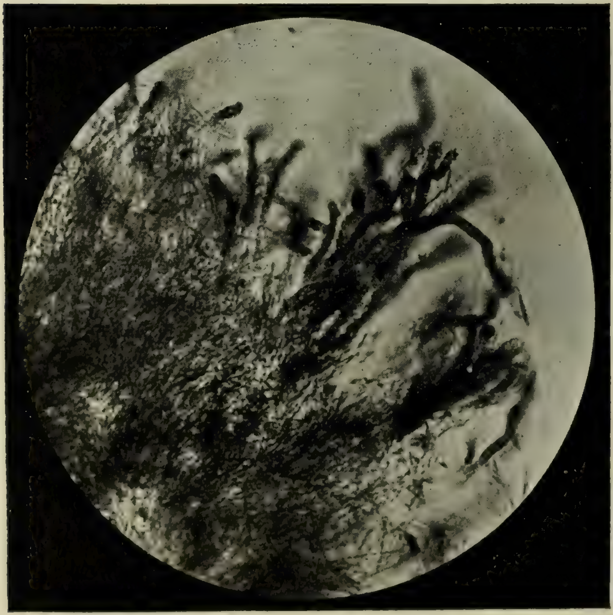
The material from which this photograph was made, and all of those which follow up to Fig. 35, was obtained by scraping the approximal surfaces of teeth after thorough syringing with sterilized water and, in some instances, also after rubbing the surface of the tooth with a wad of sterilized cotton-wool. The gelatinous mass of micro-organisms adheres to the surface of the enamel with considerable tenacity. The scrapings were stained with watery solution of gentian-violet-anilin water and mounted in diluted glycerol as described in the text. Under a power of four or five hundred diameters places will be found presenting such appearances as are shown above.

FIG. 13.



Fructification heads of Leptothrix racemosa. Zeiss obj. 3 mm. proj. oc. 3.

FIG. 14.

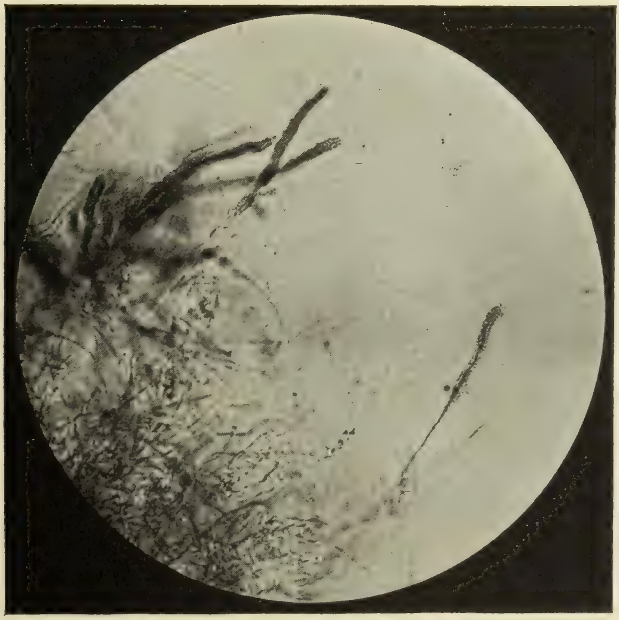


Same as preceding illustration.

segment containing a spore-like body. The terminal ends of the threads are often club-shaped, and these stain very deeply. (Fig. 7.) Some of these enlarged ends seem to be composed of several segments, and the protoplasm in them appears to undergo segregation at a certain stage, and afterward to collect in bodies which so closely resemble micrococci and diplococci as to be indistinguishable from them. (See Fig. 27.) This thread-like organism may sometimes be seen branched, and the branches always arise from the spore-like bodies. (Fig. 8.)

I believe this to be the initial step in the formation of the thread-like organism. A very large thread-like organism, which may be the Bacillus buccalis maximus of Miller, also shows within its segments, when stained hot by the Gram method, bodies which closely resemble several forms of bacteria. This is probably one of the forms seen and figured by Vicentini. The accompanying photographs show several other forms of micro-organisms, some of which have been isolated by cultivation and others obtained in almost pure growths direct from the mouth. (See Figs. 9, 10, and 11, the two last mentioned being striking illustrations of pure growths direct from the mouth, and arranged in forms or patterns supposed to be so characteristic as to make their identification certain.)

FIG. 15.

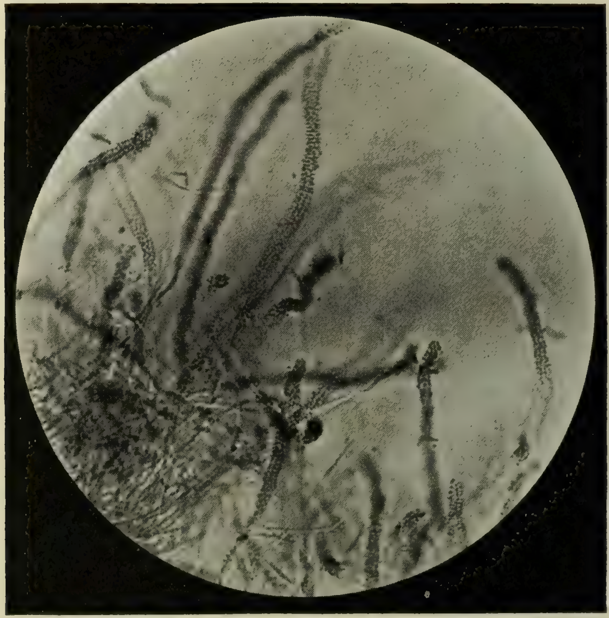


In this photograph the attachment of the spores of the fructification heads to the central stem by means of sterigmata or peduncles is plainly shown in the single head on the right.

With this complete demonstration of acid-forming micro-organisms attached to the enamel of human teeth it would seem as though the last point had been cleared up with reference to the exciting cause of dental caries. I trust that my belief may not prove over-sanguine that those who have challenged these views will now make cordial acknowledgment of their soundness.

I have in the foregoing pages several times called attention to evidences of the pleomorphism of the bacteria of the mouth, but I have now to present to you most complete evidence on this point of a somewhat startling and revolutionary character, and containing matters of the deepest interest not only to dentists and medical men, but to bacteriologists in general.

FIG. 16.

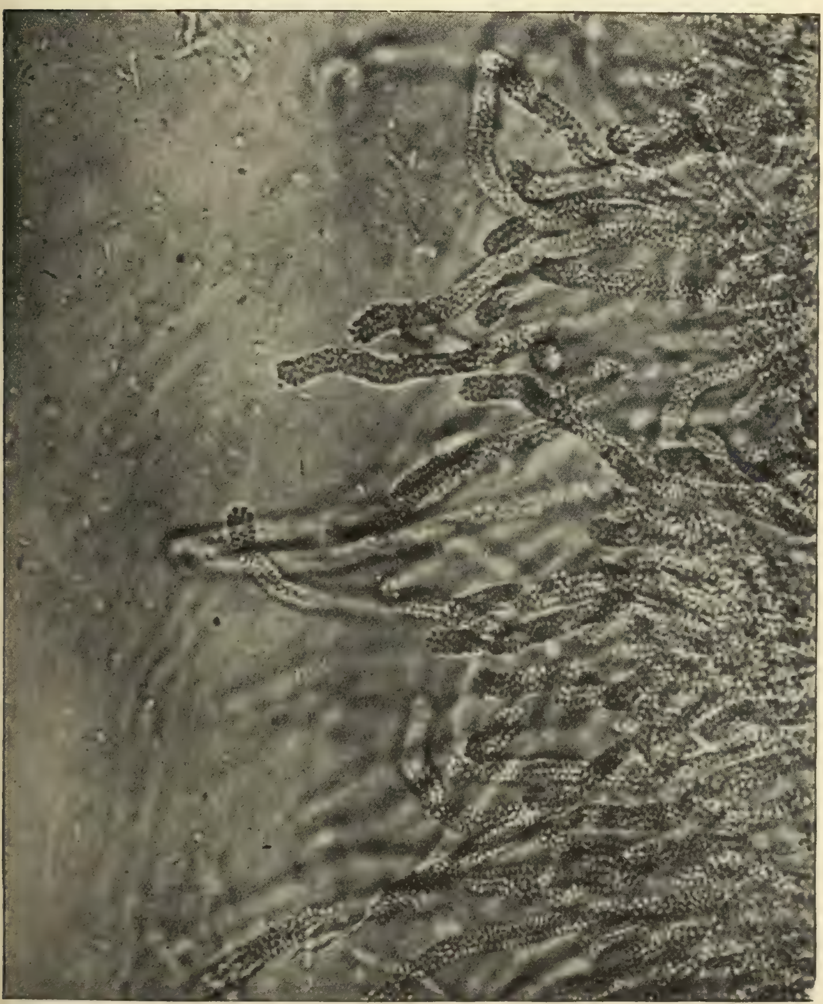


Shows budding of the spores on the stems ot Leptothrix racemosa.

The study of the life history and pleomorphism of the bacteria found in the human organism has, I shall venture to say, been too much neglected. The reasons for this may perhaps be partly found in the inherent difficulties of the problem, and also in the pleasure and prestige which the investigator finds in the cataloguing of so-called new species. And although it has from time to time been suggested by those who have studied this subject from the point of view of the botanist and the biologist that the many forms of bacteria known may in many instances represent but passing or accidental phases in the life history of some organism, although they have pointed out that many fungi whose life history has been completely followed out have supplied strong evidence that the parent organisms are comparatively few, still the cataloguing of species has progressed until there are now, I believe, not far from a thousand species registered.

Bacteria, almost more than any other form of organic life, are the creations of their environment. They are prone to undergo marked modifications by changes in the conditions under which they live. There is a great mass of facts in such works as Plowright's "Monograph of the British Uredinea and Ustilagineæ," and De Bary's "Comparative Morphology and Biology of the Fungi Mycetozoa and Bacteria," showing the tendency of these micro-organisms to perpetuate certain phases only of their life history

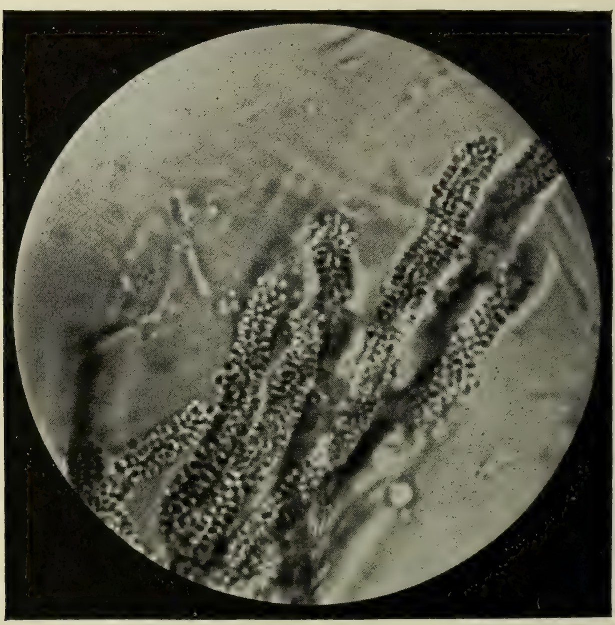
FIG. 17.



Thick growth of Leptothrix racemosa fructification heads from approximal surface of tooth, under high magnifying power.

when cultivated on or in certain media. For instance, the spore-like bodies known as the spermatia of the Uredine "multiply themselves by budding in saccharine solutions in exactly the same manner as the spores of Saccharomyces." Puccinia graminis, the mildew of wheat, is now known to pass one phase of its life history upon wheat and another and quite different phase upon the leaves of the barberry. Until comparatively recent times the barberry fungus was supposed to belong to a totally distinct genus to that found upon wheat. Plowright gives a table of forty-seven species of fungi each of which has, at a certain stage of its existence, been classed as a distinct species, but which investigation has shown to be merely a phase of one and the same species. Kurth's Bacterium Zopfii is the name given to a micro-organism originally found in the intestinal canal of fowls, and which "vegetates at first in the form of small rods when placed on a fresh nutrient substance. If the substratum is solid, gelatin, for instance, with meat extract, the rods remain connected together and form long filaments, often with intercalary spiral coils and knots; in a fluid substratum, short resting filaments are formed at high temperatures only, and at 20° C. the rods separate and swarm. When the nutrient substratum is exhausted the filaments and rods break up into cocci which do not themselves divide again, resist unfavorable external agencies, and development into rods and filaments if supplied with

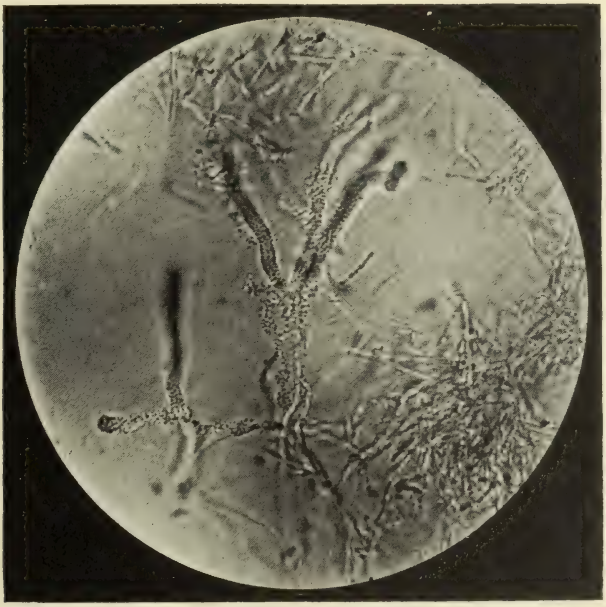
FIG. 28.



Fructification heads of Leptothrix racemosa magnified two thousand diameters.

fresh nutriment."* As one might expect in this field of investigation, as in many others, a certain number of individuals, belonging to a type of mind which seems ever in the state of being ready to lose its critical judgment over every new discovery, have carried the idea of the pleomorphism of micro-organisms to absurd lengths. It seems so very difficult for many to keep to that narrow middle way wherein truth is most frequently to be found. But, notwithstanding the reactionary effect of extreme views, the belief that there are far fewer true species of bacteria than have been catalogued has steadily gained ground among botanists and biologists, if not among pathologists.

FIG. 19.



The tendency with the pathologist, who is chiefly concerned to find a specific cause for his disease, to regard every separate form of micro-organism which appears constant under a single method of cultivation as a distinct species is perhaps quite natural, but there is not room enough for the truth in any theory which is not large enough to contain *all* of the facts.

The problem of the pleomorphism of fungi is intimately associated with their methods of reproduction. Of these methods of propagation the two known as reproduction by fission, or cell division, and by the formation of spores, called endogenous spore formation, are most familiar to students of bacteriology. Arthrosporus reproduction, or the separation of a single member to become the initial member of a new combination, somewhat resembles spore formation. But very little is known of this process at present. There is another method of spore formation known as acrogenous abjunction, in which the terminal cell, or, as I believe, often more than one cell, becomes enlarged and transformed into what is known as a basidium, from which external sprouts or sterigmata arise bearing spores on their ends. So far as I am aware, only one observer has, up to the present time, claimed to have seen this method of reproduction in the bacteria of the human body. Somewhat more than a year ago, while studying mouth bacteria, I came across very regular arrangements of coccus forms about the ends of leptothrix threads. At first I regarded these as purely accidental. But the persistence and regularity of these forms in nearly every one of the preparations I was then making led me to examine them more closely, and I was astounded to find what appeared to be a thorn-like connection between the spore or coccus form and the leptothrix-like thread. Mentioning this matter to a friend, he asked if I had seen the then recently issued English translation of the work of Dr. Filandro Vicentini, of Naples. I replied that I had never heard of it. I made a note of it, however, and after some little inquiry obtained a copy. Subsequently I found that Mr. J. Howard Mummery had briefly reviewed and criticised this work in a short paper read before the Odontological Society of London. During the past year I have made many inquiries among medical men and bacteriologists, but, outside of

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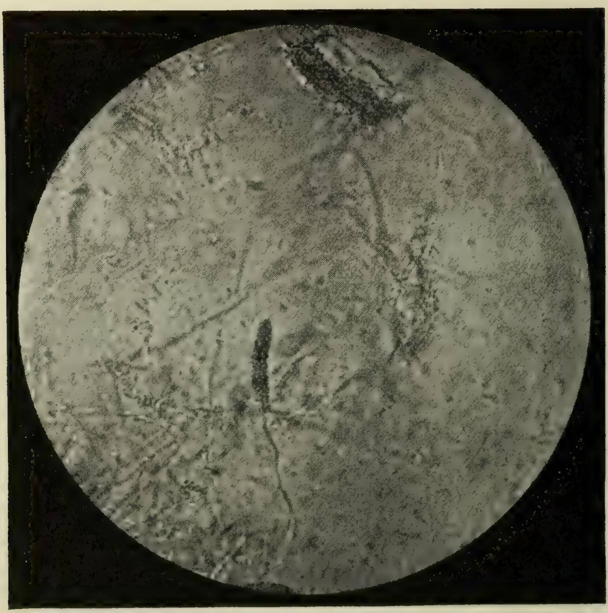
*De Bary's Comparative Morphology and Biology of Fungi, page 469.

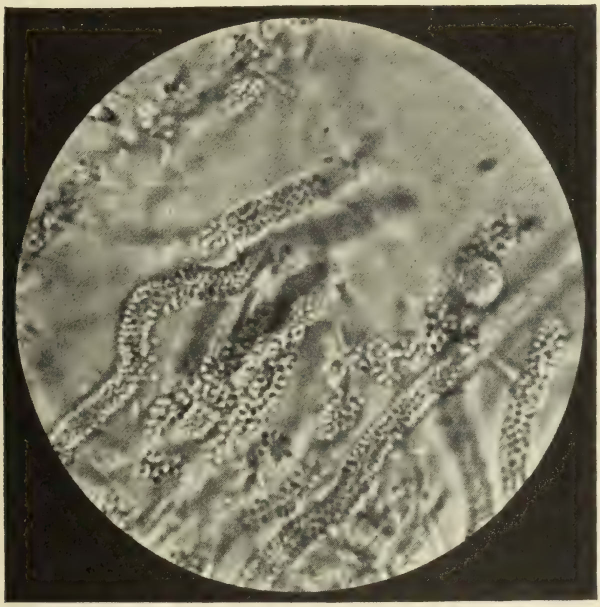
FIG. 20.



At the top of the field in this view is seen a partially crushed head of Leptothrix racemosa, usually spoken of as a zooglea mass of micrococci.

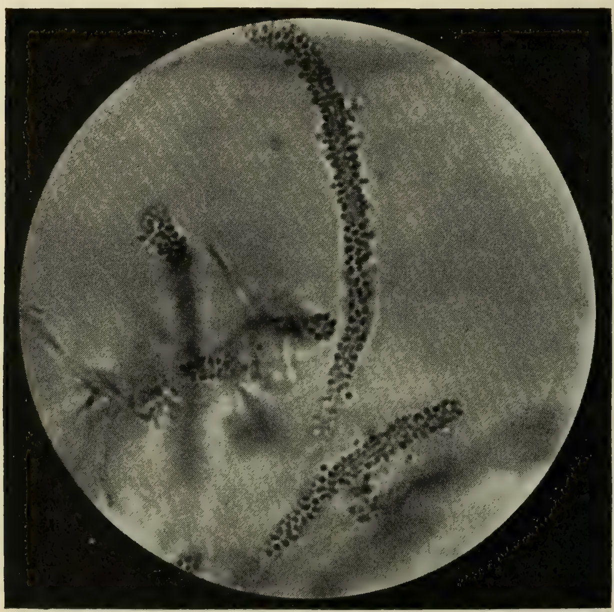
the members of the Odontological Society, I have failed to find any one who had even heard of Dr. Vicentini's work. In Vicentini's book I found that he had discovered and minutely described the organism I had observed, some two or three years before I had seen it. To him therefore belongs the entire credit of having first made a discovery which I think must be regarded as the most important in the entire history of the bacteriology of the human mouth, and one which I believe is destined to profoundly modify our entire conception of this whole subject. After having read Dr. Vicentini's book I went forward with my own work, in which I have cleared up several points not touched upon by my Italian predecessor, and the results of that work I will now lay before you. In all of my histological work I have always insisted on the employment of a variety of methods, and I have particularly recommended the employment of glycerol and combinations of glycerol, spirit, and water as mounting media for purposes of study. It was in a glycerol and spirit medium that I first discovered the organism I am about to describe, and most of my photographs illustrating it have been made from preparations mounted in this manner; and, curiously enough, it was in glycerol that Dr. Vicentini made his discovery, although his method of working differed considerably from mine. My method of proceeding is as follows: A stream of sterilized water is thrown from a powerful syringe into the angle where two teeth meet, let us say between the first and second upper molars. With a sharp, sickle-

FIG. 21.



shaped instrument, which has been sterilized, I remove a portion of the gelatinous microbic plaque, which may nearly always be found on the approximal surfaces of even fairly well-cared-for teeth. We shall find on our instrument a small mass of grayish-white material, which adheres to itself with considerable tenacity. This is placed in a clean watch-glass crystal and covered with twenty or thirty drops of a rather thin watery solution of methyl violet anilin water. The mass is allowed to remain in this solution for twelve hours, occasionally teasing it apart a little to allow the staining fluid to penetrate as much as possible. The staining fluid is then poured off, and the mass washed first with a few drops of sterilized water and then with a mixture of equal parts of glycerol, spirit, and water. A drop of this same mixture is then placed on a cover glass, the stained mass put into it and teased apart as much as possible, and then carefully inverted on a slide, being very careful to make but little pressure at first upon the cover glass. If the preparation is now examined under a one-quarter or a one-sixth-inch objective, fields will probably be somewhere found which resemble the photographs shown in Figs. 12, 13. Projecting from the edges of a mass of thread-like micro-organisms we shall see what at first appear to be very marked enlargements of the ends of some of the leptothrix forms. These enlarged ends vary greatly in length, although but little in

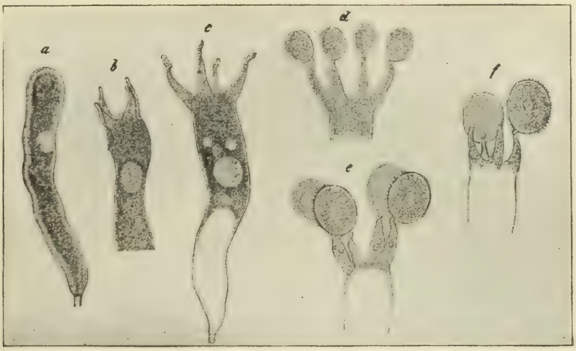
FIG. 22.



There are appearances in this photograph and in several others shown in this paper which indicate that the spores of Leptothrix racemosa begin to multiply by fission while still attached to the parent stem.

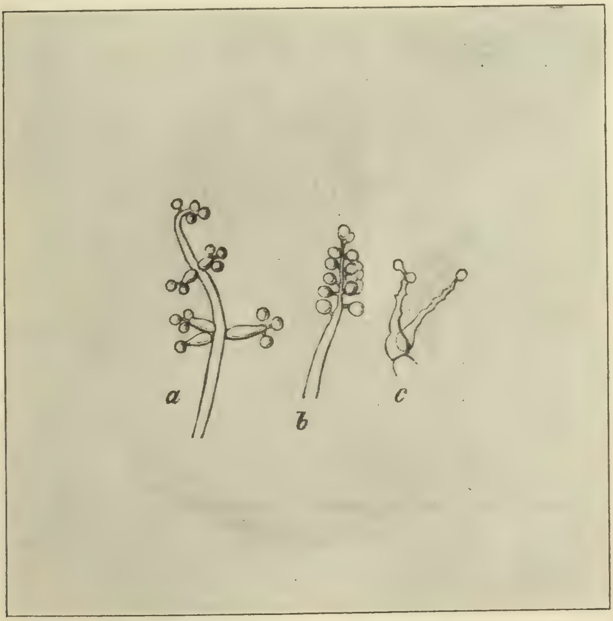
diameter. Under a one-tenth or one-twelfth-inch objective we may, in fortunate specimens, discover such fields as are shown in Fig. 14. Such views very closely resemble a grass plot, from which arise the blossom, fruit, or seed-heads of the plant. And this is really precisely what we are looking upon. These are the fruit or spore-heads of a thread-like micro-organism which I have found to be as constant as any form of bacteria in the human

FIG. 23.



Corticium amorphum, showing various stages of spore formation. (From De Bary.)

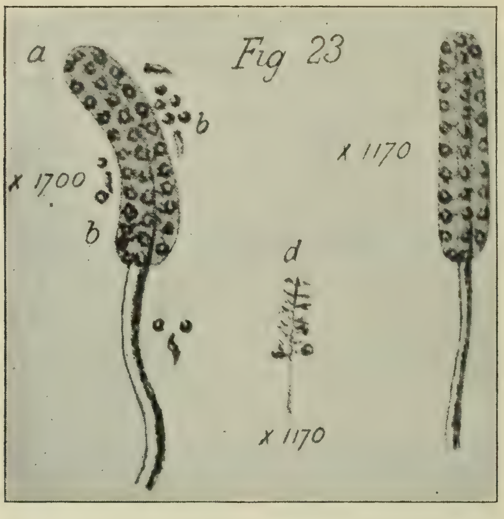
FIG. 24.



Botrytis Bassii, showing spore formation. (From De Bary.)

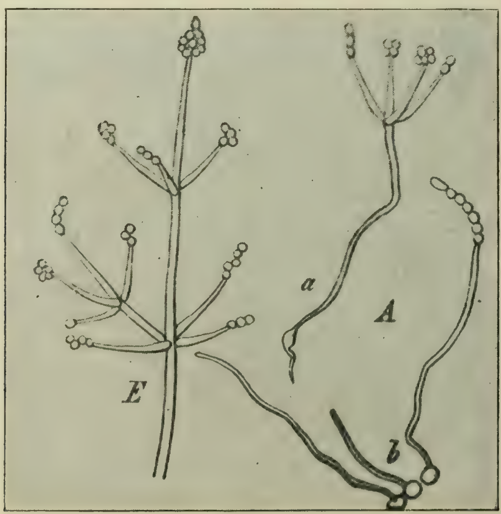
mouth. As a matter of fact, I have not yet failed to find it in any mouth I have examined for it. This is the micro-organism which Dr. Vicentini named Leptothrix racemosa, a name I shall provisionally accept because I am not yet certain that it is a leptothrix form.

FIG. 25.



Fructification of Leptothrix racemosa. A drawing by Vicentini in his work on "Bacteria of the Sputa and Cryptogamic Flora of the Mouth."

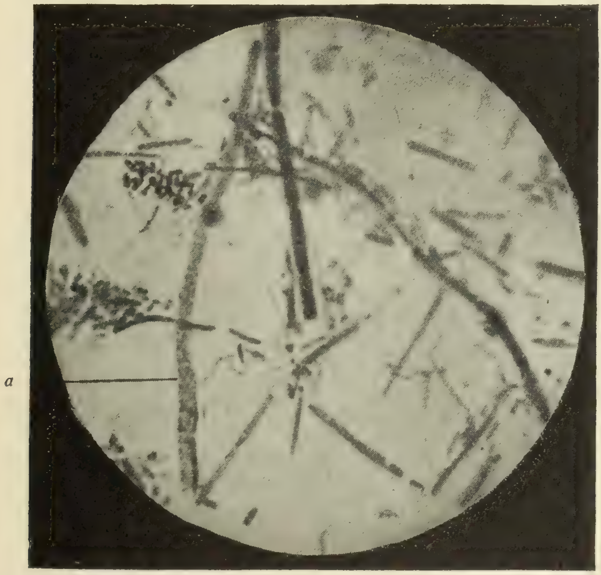
FIG. 26.



Cordyceps militaris, showing formation of spores and sprouting of secondary spores. (From De Bary.)

We see that these fruit or seed-heads of Leptothrix racemosa are made up of minute and generally regularly arranged rows. Dr. Vicentini says that there are always six rows. I have found by securing a few lucky views of cross or transverse sections of the heads that there are sometimes twelve rows or even more. Dr. Vicentini says that he was only able to discover the stems, thorns, sterigmata or peduncles which connect the spores to the parent stalk when he secured a very superior one-twenty-fifth-inch objective. But I have had no difficulty whatever in photographing them with my one-eighth or three mm. apochromat. Zeiss lens. They may be clearly seen in the single stalk shown in Fig. 15. A budding head is seen near this single stalk, and buds are also observed growing out low down on the central stalk, as shown in Fig. 16. In Fig. 17, as seen under a high power, there are many places where the connection of the spores to the parent stem may be plainly seen. Generally when the spores first appear the sterigmata are very slender, but they subsequently enlarge until they produce, with the spore, a club-shaped organism indistinguishable, morphologically, from one of the forms of the bacillus of diphtheria. Such club-shaped spore formations are shown in several places in Fig. 18, while the younger and very slender forms are seen in Fig. 19. A single short head is shown in Fig. 20, while on the opposite side of the field is observed a crushed head, an appearance usually

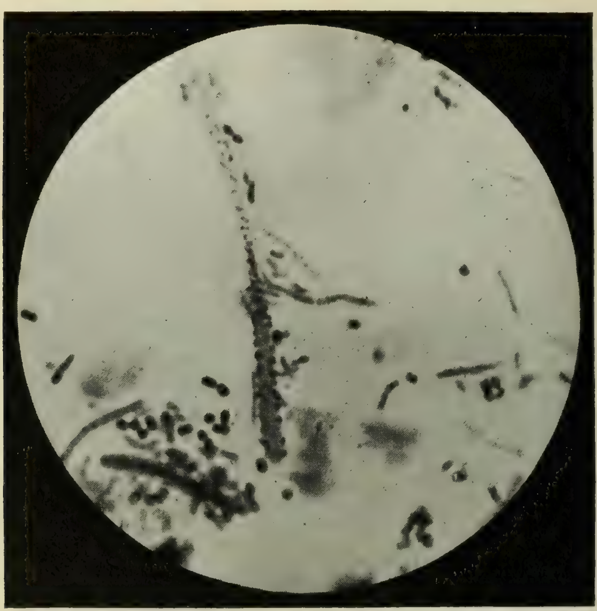
FIG. 27.



Showing at *a* what I believe to be the enlarged end of thread or basidium, the first stage in the formation of the fructification head of Leptothrix racemosa. Balsam mount. Zeiss obj. 2 mm. proj. oc. 6.

spoken of as a zooglea mass of micrococci. Seen under a power of about two thousand diameters, as in Fig. 21, the spores are seen to vary considerably, both in shape and size. While the majority are round or sphere-shaped, many are oval or ellipsoidal, and some few are curved. There are many appearances which indicate that the spores either begin to multiply by fission before they become separated from the parent stalk or are pushed outward by the formation of a secondary spore, which is formed from the same source as the first one, as shown in Fig. 22.

Fig. 28.

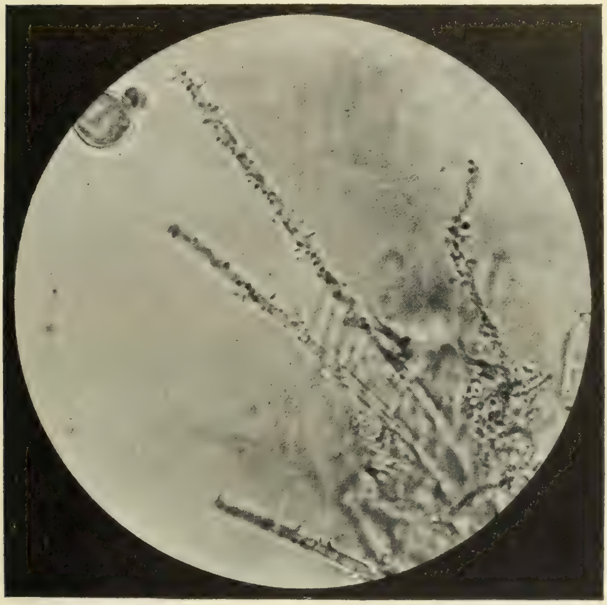


Showing the budding of the basidium or fertile head of Leptothrix racemosa. Balsam mount. Zeiss obj. 2 mm. proj. oc. 6.

There are known parallels for both methods in forms of fungi, the life history of which has been completely worked out, although we shall probably never be quite certain that this is true of Leptothrix racemosa unless we succeed in cultivating it, a feat of which, I am sorry to say, there is not much hope at present. Before proceeding to further consider the significance of these new facts let us examine some of the parallels, among the allied forms of life to which I have referred, for what seems at first sight like a very radical departure from all of our present views of the multiplication of bacteria.

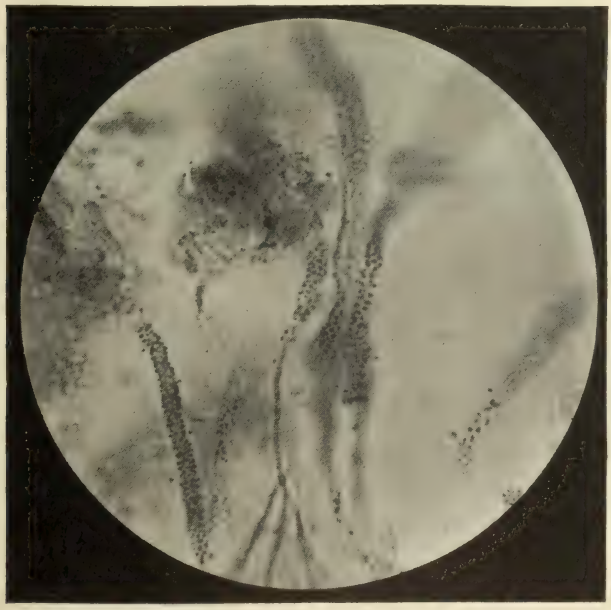
Figs. 23, 24, and 26 are from De Bary's work, to which I have already alluded. The first shows the successive stages of the development of spores in Corticium amorphum. We have first, at *a*, the basidium corresponding closely with the terminal part of

FIG. 29.



Budding of heads of fertile threads of Leptothrix racemosa. Glycerol mount. Zeiss obj. 2 mm. proj. oc. 6.

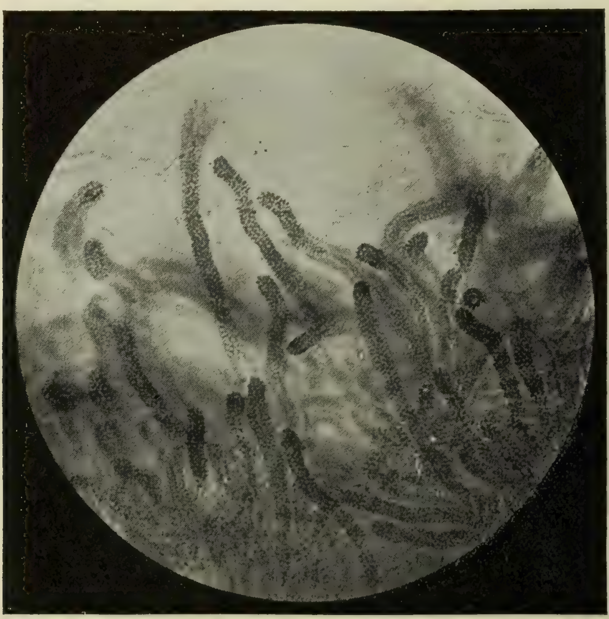
FIG. 30.



the stalk of Leptothrix racemosa, as may be seen by comparing Figs. 27 and 28, showing the basidium of Leptothrix racemosa, with the illustration just mentioned; then, at *b*, the budding of the sterigma, followed by the development of spores on the outermost points of the sterigma. Fig. 24 shows sporulation of Botrytis Bassii. In the middle branch, shown at *b*, we see that the process of spore formation is almost identical with that of Leptothrix racemosa, as shown in the reproduction of the drawing by Vicentini, Fig. 25, at *d*.

In Cordyceps militaris (Fig. 26), a fungus which attacks caterpillars, we see the spore-like bodies forming groups and chains while still retaining their relation to the parent stem, somewhat after the manner I have already mentioned as occurring in Leptothrix racemosa.

FIG. 31.



Many further parallel illustrations might be given, but the foregoing will be sufficient for our present purpose. Viewed from the standpoint of comparative morphology, there is, as we see, no cause for surprise in this discovery of the fructification of Leptothrix racemosa. It is, in truth, precisely what we might have expected if our attention had not been so concentrated on the work of cataloguing its different constituent elements as separate and distinct species.

The principal difference which distinguishes the sporulation of Leptothrix racemosa from the fungi to which I have just called your attention is in the decreased length of the sterigma and the more compact heads which the former shows. This shortening of the sterigma in the fructification of Leptothrix racemosa is a good illustration of adaptation to environments. The buffetings and general rough usage to which this fungus is exposed in the mouth make it absolutely necessary to its existence that its fructification form should be as compact and resistant as possible. These spores would probably never reach maturity if they were developed on sterigmata as long and slender as those of Puccinia graminis or Exidia spiculosa. Figs. 27 and 28 show different stages in the formation of the basidium or enlarged terminal cells of the fertile filament of Leptothrix racemosa from which its fructification head is developed. This club-like enlargement of the growing end of the filament to which your attention is called is characteristic not only of the Hyphomycetes, but of all those species of micro-organisms which are conjectured to be degenerate forms of Hyphomycetes, such as the bacillus of diphtheria, of tuberculosis, and of anthrax. It is also found in Cladothrix, Crenothrix, and Beggiatoa, forms which are classed as bacteria, but which probably stand nearer the Hyphomycetes than do those which are parasites of the human organism. This club-like enlargement seems to be produced by increased activity, and changes in the protoplasmic contents of the bacterial cell. It stains much more quickly and deeply than do other parts of the same fiber. But this activity of the cell protoplasm appears to be completely exhausted in the production of the spores, for soon after these begin to appear the rod stains feebly and slowly. There are strong indications that the com-

FIG. 32.

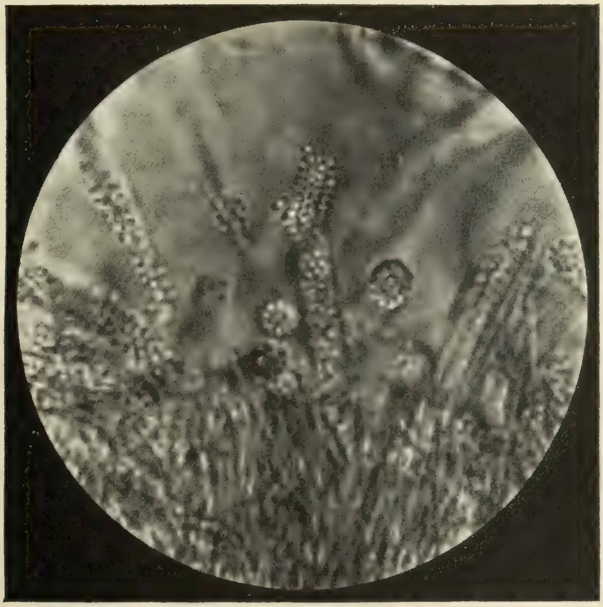
mencement of the formation of the spores takes place within the protoplasm of the basidium, and that they grow out to complete their development externally. In Fig. 27 we see a basidium containing many spore-like bodies which are still entirely within the cell wall. In Fig. 28 we see another basidium in which these spore-like bodies are penetrating the cell wall and are already projecting somewhat beyond it, while in Fig. 29, from a specimen mounted in glycerol, we observe the formation of the sterigmata well advanced bearing these minute spore-like bodies upon their terminal points; and wherever we can look directly down upon these terminal points we see them deeply stained and corresponding exactly in appearance with the spore-like bodies seen at first within the cell protoplasm. I believe, therefore, that the fully-formed spore represents a body the development of which, while completed externally to the cell, is begun within it. The formation of spores in Leptothrix racemosa generally, although not invariably, begins at the extreme tip of the fertile stalk and proceeds downward. Sometimes a few isolated spores may be seen standing on their fine peduncles or sterigmata at some little distance below the main head, and still below these one may see spore-like bodies within the cell. These have been called "gemmules of reserve" by Dr. Vicentini, but the appearances all indicate that they represent the commencement of the formation of a spore; and if the life history of this particular fiber could be followed it would probably be seen that these bodies sprout through the cell wall. The isolated spores and those developing within the cell wall may be observed in Fig. 30.

The attachment of the spores to the central stalk, which is really the final and irrefutable proof of the true fructification of this micro-organism, is finely shown in Figs. 31 and 32, and in many others of the accompanying photographs. In Fig. 33 the spore attachments are beautifully shown in both longitudinal and transverse section. Fig. 34 shows enlargements of the transverse sections to about eight thousand diameters. Some very interesting details of structure have been brought out in these high magnifications.

The action of the glycerol in which the specimens are mounted has caused a temporary shrinkage of the protoplasm from the cell wall between which we see a narrow light space; and across this space the sterigmata of the spores may be seen passing to the substance of the protoplasm within the cell. There also appears to be a condensation of the cell protoplasm at all points where the sterigmata arise. There are, furthermore, in Fig. 34, appearances of the cell protoplasm, previously noted by other observers, which indicate that the central part differs in structure from that lying next to the cell wall. The central part of the protoplasm of the bacterial cell has been spoken of by some investigators as tubular. In my glycerol specimens it is seen to be more deeply stained than the part lying next to the cell wall.

Reviewing the various stages of the fructification of Leptothrix racemosa which are illustrated in the accompanying photographs, we see first a club-shaped enlargement of the outer ends of the fertile fibers, which stains more quickly and deeply than the rest of the fiber. The next stage, apparently, is the segregation of the protoplasm in the enlarged end into spore-like bodies, but which differ from spores in staining more easily. Next, a slight bulging or protuberance of the cell wall directly over each spore-like body is observed, followed by various stages of the sprouting of the sterigmata and the formation and full development of the spores upon their terminal points. A great majority of the spores are coccus-shaped, but some of them are oval, and they vary considerably in size. Some of the spore bodies apparently begin to multiply by fission before they are detached from the parent stem. These, when separated from the stem, would have the morphological appearance of diplococci. When single spores with their sterigmata are detached they have the form of the club-shaped diphtheroid bacillus, and sometimes of a curved bacillus. Leptothrix racemosa is common to all mouths which I have examined. The forms which must result from the breaking up of the spore heads and stems of this micro-organism are long and short rods, various sizes of micrococci, various sizes of diplococci, and various sizes of curved and club-shaped bacilli. I have no disposition to indulge in speculation over these discoveries, but here are the facts which must be reckoned with in all future considerations of

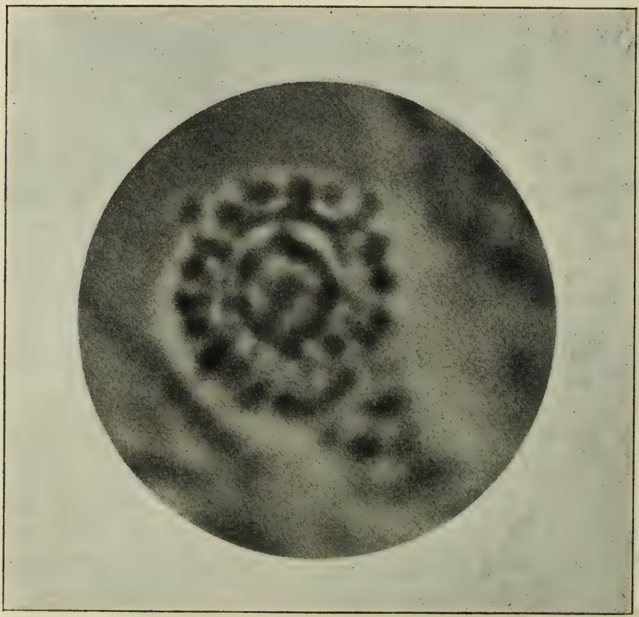
FIG. 33.



Showing attachment of spores to central stem in both longitudinal and transverse section.

the bacteria of the human mouth and body. It would be folly to deny that these facts are big with possibilities. After the most thorough cleansing of my own mouth by the aid of tooth-brush, pick, silk floss, and powerful germicides I have, after forty-eight hours, found the fructification heads of Leptothrix racemosa growing luxuriantly. They must therefore develop with considerable rapidity. However much we may be disposed to reticence, it is impossible to avoid asking what becomes of the enormous number of micro-organisms of different forms and sizes which are being constantly shed into the mouth by this parent organism, and how many of them have been classified as permanent species.

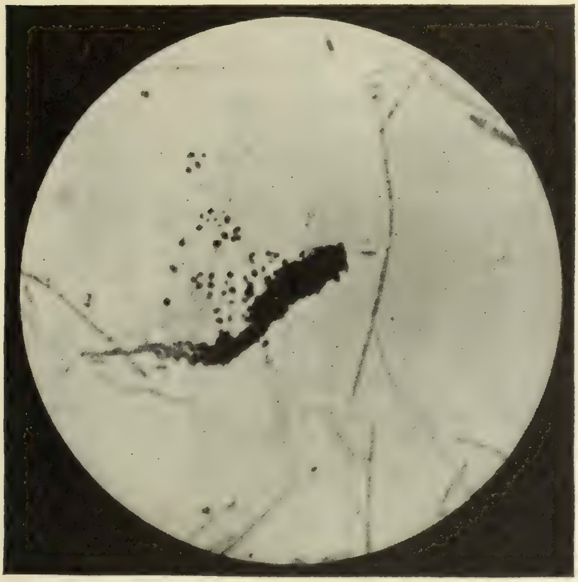
FIG. 34.



This photograph is from an enlarged negative made from an original photograph of transverse section of fructification head of Leptothrix racemosa. The original negative was magnified to 2000 diameters. The enlarged negative and the above print represent an amplification of about 9000 diameters. It shows the cell wall and the shrinkage of the protoplasm caused by the action of the glycerol and spirit. The spore stems or sterigmata are seen to arise from the central protoplasm and to pass through the cell wall.

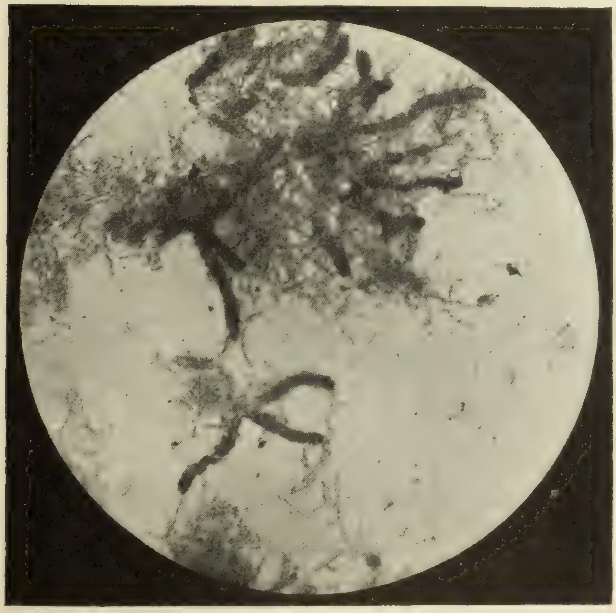
It now becomes perfectly plain why such a large number of different forms are found in the microbic plaques which Dr. Truman supposed to be chiefly or entirely composed of Leptothrix buccalis. A large majority of these forms are undoubtedly the product of Leptothrix racemosa. The zooglea masses of micrococci so frequently met with in these microbic plaques are probably entirely composed of the spores, generally the crushed spore-heads, of our new organism. In Fig. 35 a spore-head is shown with a bare place where some of the spores have evidently been brushed off and are scattered about in the vicinity. The most conservative

FIG. 35.



Fructification head mounted in balsam and showing detachment of spores.

FIG. 36.

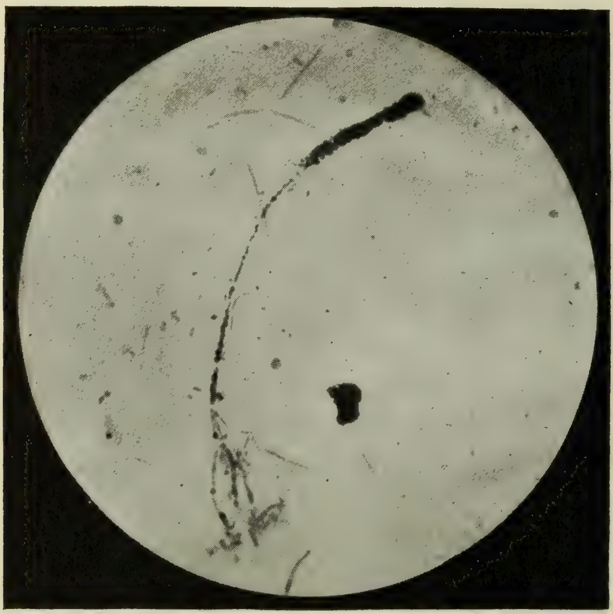


Group of heads mounted in balsam.

and skeptical observer could, I think, have no hesitation in admitting that the scattered spores of various sizes and shapes came from the partially destroyed head.

That hundreds, I might say thousands perhaps, of expert bacteriologists should have worked for years at these problems without discovering this important organism is, I have no doubt, entirely due to the fact that nearly all bacteriological specimens are mounted in balsam, a method almost certain to destroy these fructification heads. Figs. 35 and 36 are photographs from the most successful balsam-mounted specimens of the fructification of Leptothrix racemosa that I have been able to prepare after many attempts. The superiority of the glycerol mounts is seen at a glance. That Dr. Vicentini's work should have been received with almost complete silence was partly due, I think, to his having presented only drawings in proof of his discovery, and more perhaps to his having claimed so much for this parent organism which he, with more boldness than wisdom, describes as the source of *all* the bacteria and bacilli found in the sputa. So patent an error could hardly fail to discredit him at once in the eyes of well-informed bacteriologists. Nevertheless, I regard it as greatly to the discredit of the scientific world that Dr. Vicentini's work should have been so completely ignored. The mistakes of an enthusiast do not constitute a sufficient justification for throwing

FIG. 37.



Showing identity of sporulation form with the new beaded thread form. Zeiss obj. 3 mm. roj. oc. 6.

him overboard, especially when he has facts of the greatest importance left to his credit after all the errors are removed.

The suggestion which Vicentini and others have made, to the effect that the pathogenic qualities of bacteria are probably acquired and not necessarily permanent, should have the most careful consideration. I have invariably found a greater variety of micro-organisms in mouths which are comparatively healthy than in those which exhibit some specific form of disease. I do not know whether this has been noticed before or not, but the fact seems to me a significant one. It points to a balancing of forces in the conditions of health in which the more pathogenic micro-organisms are more or less completely subdued by benign forms. The conditions change and become favorable to the development of specific and harmful forms, and the benign ones are less in evidence, or, as I believe is not infrequently the case with some of those forms in which we as dentists are most interested, they are harmful or benign in accordance with or in response to the conditions of their environment. I believe it is an established fact that certain forms of micro-organisms which give an alkaline or neutral reaction when cultivated in certain media will give an acid reaction if a small percentage of glucose be added to the cultivation fluid. You see how the slowly-accumulating facts are beginning to bring our contradictory clinical observations into harmony. These fluctuations in decay of the teeth which we have so long observed are due not to changes in tooth-structure, an hypothesis which could never be held for a moment by those who understand how slow the changes in dentin are and how impossible any true physiological change in enamel must be, but to changing conditions of the environments of those micro-organisms which constitute the sole exciting cause of dental caries.

I have said that I accepted Dr. Vicentini's name of Leptothrix racemosa for the new organism provisionally. My latest investigations have made it perfectly clear that the beaded thread shown in Figs. 6 and 7 is the organism on the enlarged end of which the sporulation shown takes place. (This is completely demonstrated in Fig. 37, where the spore-head is seen on a plainly-marked beaded thread, and all of the different stages of spore formation to which I have called attention in the accompanying photographs are always seen on the beaded thread and never on any other.) It is, of course, to be understood that the special treatment I have described is necessary to bring out the beaded structure. Nothing of this, or but faint indications of it, are seen in the glycerol mounts. This emphasizes the importance of using a variety of methods of staining and mounting.

Unless, therefore, the beaded fiber represents a certain stage of the development of the well-known leptothrix, or unless the new method of treatment brings out appearances never before seen in leptothrix, then the organism which Vicentini has named Leptothrix racemosa is not identical with Miller's Leptothrix innominata, but is an entirely new and hitherto undiscovered micro-organism.

CLASSIFICATION OF MALOCCLUSION.*

BY EDWARD H. ANGLE, D.D.S., ST. LOUIS, MO.

(Concluded from page 264.)

INFLUENCE OF THE LIPS, CHEEKS, AND OCCLUSAL PLANES IN MALOCCLUSION OF THE TEETH.

In the chapter on diagnosis of cases we have noted the powerful influence in normal occlusion of the muscles, the lips, and the cheeks, and of the inclinations of the occlusal planes of the teeth in establishing and maintaining harmony in relation of the teeth and also of the relative sizes of the arches. In cases of malocclusion belonging to Class I the arches are usually more or less contracted, and as a result we find the teeth crowded, bunched, and overlapping, or, as crudely designated by one author, "jumbled." In these cases the lips serve as a constant and powerful factor in maintaining this condition, usually acting with equal effect upon both arches, and effectually combating any influence of the tongue or any inherent tendency on the part of nature toward self-correction. In other words, the narrow and diminished sizes of the arches are fixed, and they are prevented from enlarging by the lips with a force equal in power to that exerted when the arches are of normal size and the teeth in normal occlusion. Likewise, each inclined plane of the cusps out of harmony in the occlusion serves to maintain it in its malposition, or to wedge it still farther out of position upon each closure of the jaw. These same influences are also easily traceable throughout all the other classes of malocclusion.

FACIAL ART—NORMAL FACIAL LINES.

One of the evil effects of malocclusion is the marring or distortion of the normal facial lines. It follows that, in the application of the principles of orthodontia, our efforts should be so directed that the improvement of these lines of inharmony shall result in molding and modifying them to harmonize with the ideal lines of facial beauty so far as lies within the range of the possibilities of the art and of the type and temperament of the individual. Our opportunities for benefiting humanity are very great in this field, far exceeding those offered by any other branch of dental science; for patients with facial lines so distorted as sometimes to be a marked deformity and a source of constant humiliation to themselves and their friends may be so treated as to bring about a complete transformation of the facial expression, even to the establishment of lines of beauty. But, lacking a proper appreciation of the true purpose of orthodontia, we may work in such utter ignorance of the requirements of facial art, as is often done, as to not only fail to improve the appearance, but even to produce results still more unpleasing than the original condition.

In order to work intelligently it is important that we shall have first fixed in our minds the outlines of the perfect face, so that we may ever have an ideal which, like teeth in normal occlusion, shall

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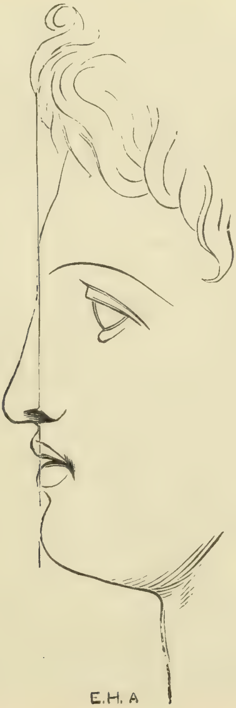
serve as a pattern from which to note deviations and to guide us in our efforts toward the establishment of the normal.

For this perfect face we shall look in vain among the people we meet. Although we may find many having more or less of the characteristics of beauty, all will be found to possess one or more lines not in harmony with the ideal face.

Raphael, the great artist, said, "There is nothing so rare as perfect beauty in woman." When painting the head of Galatea he was unable to find in the faces of the living a sufficiently perfect type of beauty to be his model, and was compelled to substitute for nature a certain ideal inspired by his fancy.

FIG. 20.



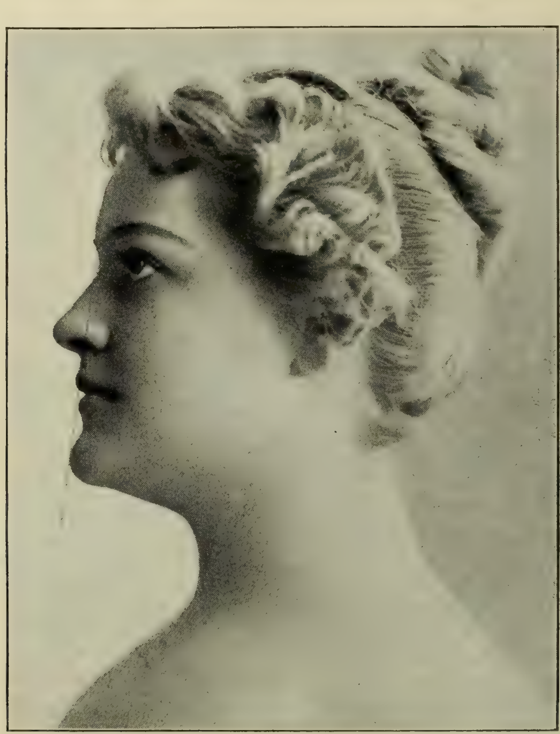
In proceeding to define beauty, all that the writers on art have been able to do is to affirm the expression of Albrecht Durer, that "beauty is the reverse of deformity. The more remote from deformity, the nearer the approach to beauty."

We must have recourse, then, to the purely ideal,—to suggest, to guide, to vary in imitation, but never to rigidly copy. "A profile well chosen, all the features will be made to harmonize with it; and according to the profile will correspond in form the beauty of all the other features. No face was ever repulsive where the profile was beautiful, and no face can be made beautiful while the profile is ugly."

Fig. 20 represents the profile of a face so perfect in outline that it has long been the model for students of facial art. It is that of Apollo, one of the Grecian mythological gods. It is supposed to be so faultless in form that to change it in the least would be to mar the wonderful harmony of proportions; as Fuseli puts it, "Shorten the nose by but the tenth of an inch and the god would be destroyed."

All the essentials of beauty found in this face can be traced with but minute variations in all other masterpieces of art representing ideal facial beauty, as the Psyche, Sistine Madonna, Medusa, Venus de Milo, etc., and consist in a short, finely curved, and prominent upper lip; a full, round, but less prominent lower lip, and a strongly marked depression at the base of the lower lip, giving roundness and character to the chin. These characteristics of the lower part of the face are elements of beauty wherever found. At the present day the pure Greek type is rarely seen, but we nevertheless do see in all handsome profiles very much the same outline in the lower part of the face that has been indicated, the variations being in the upper half of the face and not in the lower.

FIG. 21.*



In studying the perfection of the profile it will be seen that it is in perfect harmony with a straight line at three points,—namely, the most prominent points of the frontal and mental eminences, and the middle of the ala of the nose.

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*Morrison, photographer. Copyrighted.

As a convenience we shall call this the line of harmony. It will be found of great value as a basis of diagnosis, serving the same purpose in the esthetics of the face as does the line of occlusion in indicating the variations of the teeth from the normal alignment.

Fig. 21 shows the application of this line to another face of much beauty, which, it will be seen, is in harmony at the three points above indicated.

Fig. 22 shows still another very beautiful face, in which it is easy to note how nearly the line of harmony approaches the ideal; while Fig. 23 shows another face in many respects quite perfect, but when measured by the line of harmony we may quickly detect its variations from the ideal and the consequent unpleasing effect.

FIG. 22.*

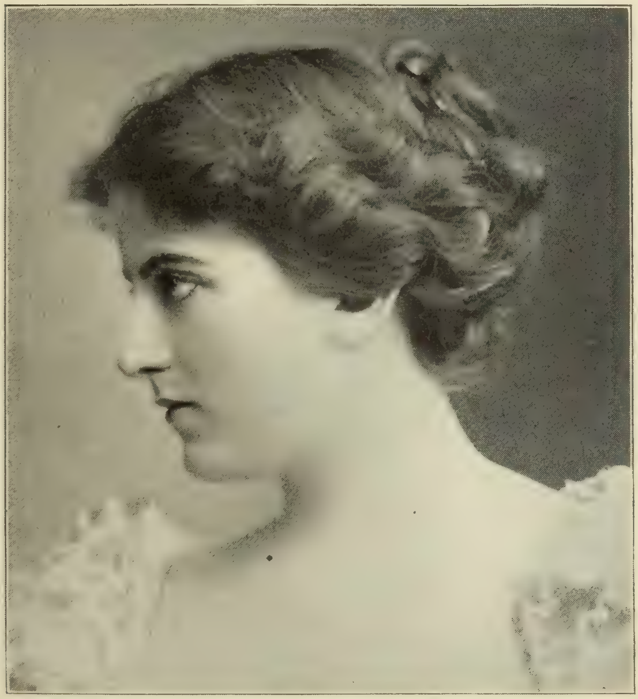

Fig. 24 shows the profile of still another face in which the variation from the line of harmony is very great, and the result a real deformity.

Dr. McDowell once suggested to me that we might possibly use this line to describe certain local variations from the normal. I think the suggestion is a good one, and will offer the following plan. As we readily find that any variation in any region of the profile may be easily detected upon application of this line, we will apply the terms pro- or sub-, according to development and

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*Morrison, photographer. Copyrighted.

FIG. 23.

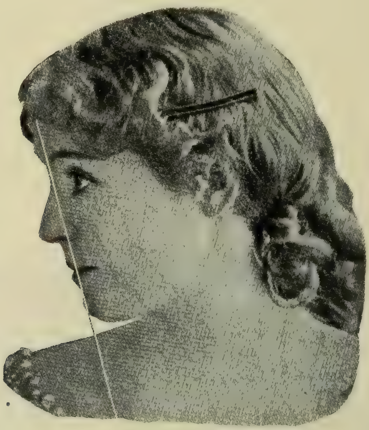
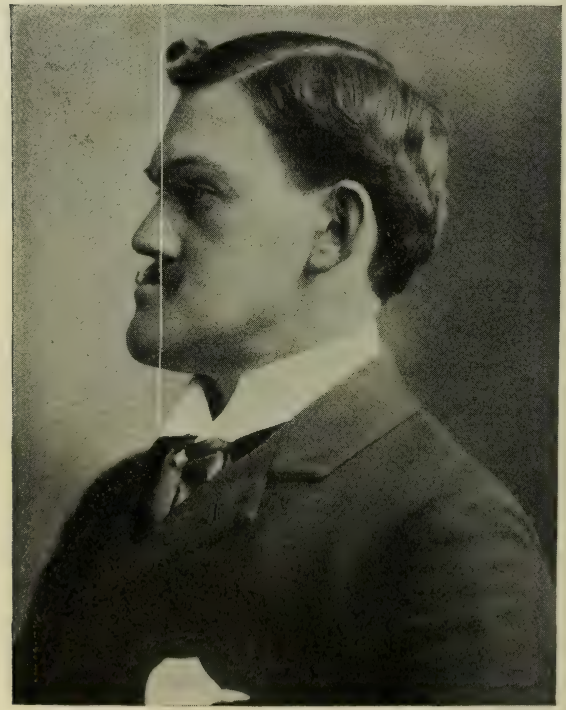


FIG. 24.



location, to designate these variations, as, for example, sub-intermaxillary, denoting an arrested development in the region of the intermaxillary bones; or pro-intermaxillary, to describe the opposite, or excessive development; pro-inferior maxillary and sub-inferior maxillary, to designate excessive or deficient development, or retrusion or protrusion of the same; or pro-mental and sub-

Fig. 25.

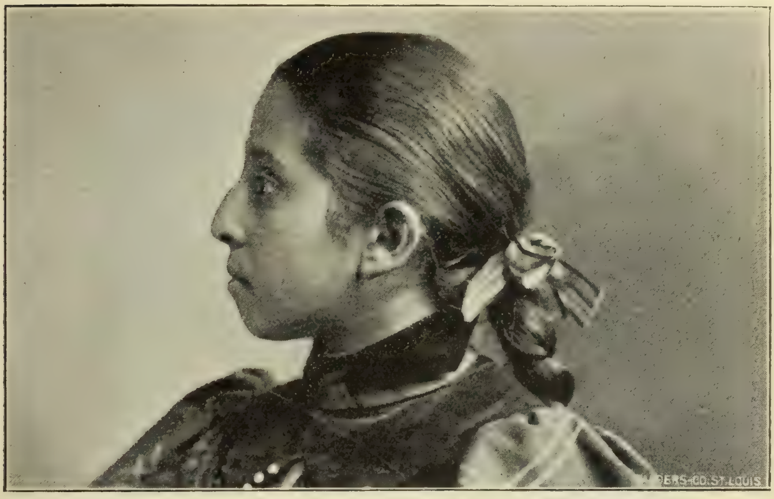
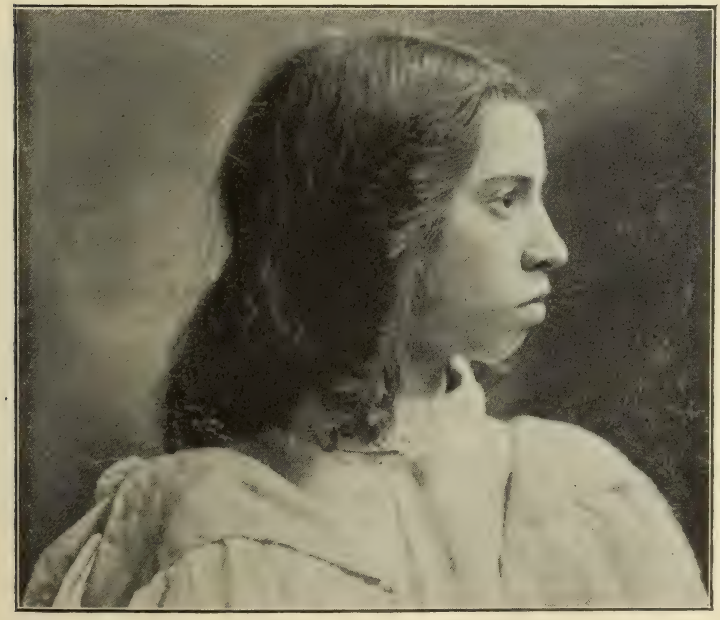


Fig. 26.



mental development, to denote excess or deficiency in the development of the chin; or pro- and sub-dental, to denote the excessive inclination outward or inward of the incisors, etc. In like manner prominence or deficiency in the development of the lips may be indicated. Fig. 25 illustrates sub-mental development; Fig. 26 illustrates pro-labial and sub-mental development.

FIG. 27.

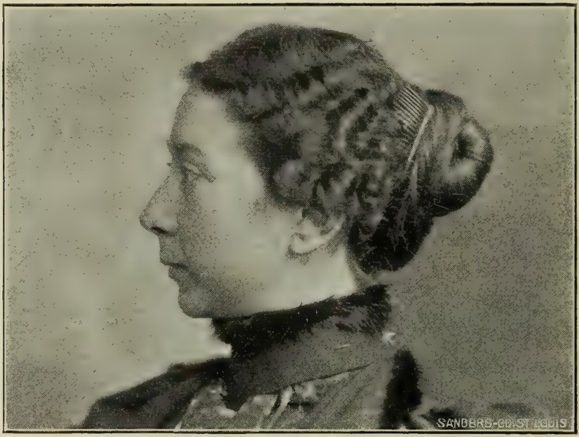
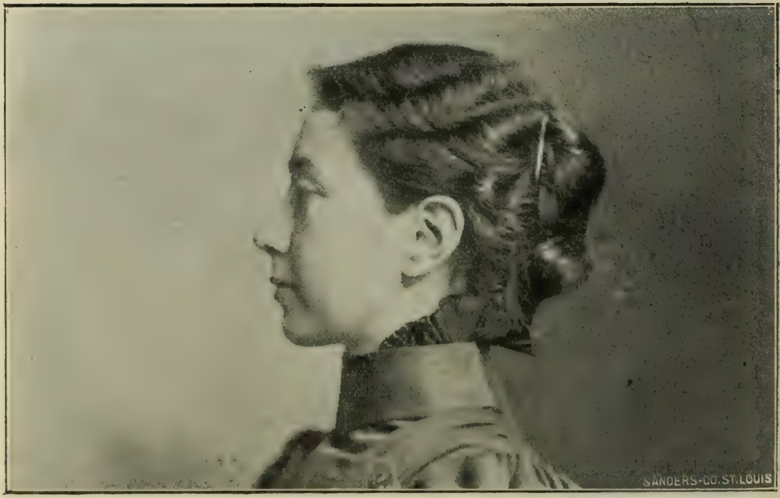


FIG. 28.



These terms seem to the author to far more nearly meet our requirements than the very limited and commonly employed terms, prothagnism and orthognathism, which were introduced by the craniologist for describing the variation of the facio-cranial angle of man and the lower animals, but which are wholly inadequate for expressing the variations caused by malocclusion of the teeth and asymmetrical development of the bones and muscles of the face.

Judgment and practice are necessary in making use of this line in order not to mistake the mal-condition of one region for that of another. As, for example, in that class of cases of malocclusion represented by Fig. 27, the mistake is commonly made of supposing it to be pro-intermaxillary development, while in reality the development is, in nearly every case, sub-inferior maxillary, as is proven by Fig. 28, which represents the same face after treatment. This consisted principally in sliding the lower jaw forward to obtain normal occlusion of the teeth, which was made possible by first establishing harmony in the line of occlusion, as described under treatment of cases of malocclusion belonging to Class II, Division 2, *a*.

All who hope to attain real success in the correction of malocclusion should cultivate a love for art and the beautiful, and form the habit of observing and carefully studying the normal and abnormal lines of the human face, together with their relations to and dependence upon the occlusion of the teeth. An appreciation and intelligent application of the principles of art must ever go hand in hand with the successful practice of orthodontia.

The ease and certainty with which teeth are now moved by means of modern regulating appliances has opened up great possibilities in this field of facial art, and there can no longer be just excuse for ignoring this most important phase of the subject.

A FEW CONSIDERATIONS IN FILLING TEETH.

BY C. N. JOHNSON, L.D.S., D.D.S., CHICAGO, ILL.

(Continued from page 242.)

MALLETS AND MALLETING.

THE selection of a mallet for the insertion of gold is a matter which must be left largely to the individual preference of the operator, and yet there are distinguishing characteristics related to the different forms of mallets that call for consideration. Laying aside the factor of personal equation, we must not ignore some of the fundamental qualities inherent in the nature of the appliance which influence its practical utility.

THE HAND MALLET.

This mallet was the first to be used for condensing gold, and it would seem to-day to be capable of a wider range of service than any other single form of mallet. No other mallet yet suggested has so many advantages with so few disadvantages. Its chief limitation relates to the necessity of employing an assistant to manipulate it, owing to the fact that the operator has too many uses for his left hand to make it convenient for him to employ it for this purpose. It is true that some practitioners prefer to do their own malleting, and by constant practice become very expert, but in the daily routine of gold filling there are too many demands on an operator's vitality without adding to them in this particular. No operator can do his own malleting without placing himself in a more strained position than would be necessary if some one else malleted, and there are times when it seems almost imperative to utilize both hands for other purposes. While it may be possible to strike a more intelligent blow and regulate the force more accurately to the requirements of the case, yet the method calls for too great a tax on the operator to make it desirable practice.

The Assistant.—The problem of training an assistant to be a good malleter is a necessary concomitant to success in the use of the hand mallet. Usually a young lady assistant is best suited to this purpose,—one who has no intention of studying dentistry as a profession. The reason for this is that to be an expert malleter the assistant should have no interest in the operation except to use the mallet. A student of dentistry naturally becomes interested in the progress of the filling, and is inclined to divert the attention occasionally to the tooth instead of concentrating it solely upon the end of the plugger handle. This diversion results in imperfect work, and any imperfection on the part of the assistant renders the hand mallet almost the worst that can be used. The quickest perception is necessary to anticipate every move of the operator, and a young lady usually possesses this intuitive perception to a greater degree than the average young man. A nod of the operator's head or the slightest intimation—so slight, in fact, that the patient need never be cognizant of it—is all that should be necessary to indicate to a capable assistant the character of blow required, whether as to force or rapidity of stroke. The assistant should be trained to develop the wrist to the highest degree of suppleness, so that in striking the blow there shall be an entire absence of arm-weight exerted upon the mallet. She should also learn to use either hand with equal facility, but in the event of one hand being developed to a higher degree of perfection than the other, preference should be given to the left hand, on account of the fact that during most operations the assistant must stand on the left side of the patient, facing the operation, thus giving the left hand the widest range of usefulness.

One of the most important considerations in the use of the hand mallet relates to the angle at which the mallet meets the plugger. The striking face of the mallet should be at direct right angles with the long axis of the plugger, or, in other words, the mallet should strike the plugger squarely on the end at every blow. Any deviation from this results in a gliding of the mallet across the end of the plugger, which interferes with its condensing power and proves very distressing to the patient. To invariably strike a square blow necessitates the constant attention of the assistant, added to a quick anticipation of any change in the angle made by the operator, so as to meet it with a corresponding change in the direction of the mallet blow. There should be developed between the operator and malleter the closest concert of action, and the one should understand the methods of the other so perfectly that no verbal instruction is necessary during an operation. This harmony of action is very reassuring to a patient and leads to confidence in both operator and assistant.

The Kind of Mallet.—Various forms of hand mallets have been devised with the idea of finding something which was alike agreeable to the patient and effective in condensing power. The steel mallet has probably been more universally used than any other, and while to some patients objectionable on account of the hard metallic ring to the blow, it still possesses characteristics which make it a very desirable form of mallet. By its use an intelligent operator can detect instantly when his gold is dense under the plugger point. There is something which telegraphs to the hand holding the plugger a sense of solidity to the filling the moment this solidity is reached, and distinguishes perfectly between a surface partially condensed and one completely condensed. This nicety of distinction is scarcely to be attained by any other form of mallet, such as those made of lead or lead covered with leather. These have a dead soft blow more acceptable to some patients, but requiring in the aggregate a large number of blows for a given density, or at least a larger number before the operator can be assured of density. With the steel mallet not one unnecessary blow need be made, while with the softer mallets the power of detection is so limited that the operator may use many unnecessary blows before he feels safe about the filling. This lack of precision would seem to confine the use of the soft mallets to those patients who find the steel mallet particularly objectionable.

The wooden mallet used by some operators is ill adapted to the purpose of condensing gold. Unless it is so large as to be unwieldy, it has not sufficient weight to be effective, and in order to gain anything approaching adequate density it requires so many blows that the process becomes exceedingly irksome to the patient. It is not only inefficient, but is objectionable in point of comfort.

The Automatic Mallet.

This mallet was devised to avoid the necessity of employing an assistant, and in the hands of some operators it seems to be an efficient appliance. But it may well be doubted whether it is ever capable of the same degree of delicacy that is easily attained with the hand mallet, or whether for most patients it can be compared to the hand mallet when comfort is considered. Given an expert assistant in a test of the two forms of mallets, and probably nine out of ten patients will select the hand mallet. There is a feature of the automatic mallet which doubtless may be held in some degree accountable for this aversion on the part of patients. In order to obtain the blow it is necessary to exert pressure on the filling with the plugger point, and this pressure carried to a certain limit, causing a sudden recoil and blow, creates in the mind of the patient a series of anticipations which in the aggregate become exhausting.

In other words, the patient is continually being warned by the pressure that a blow is to be struck, and this repeated leading up to the blow by pressure keeps the patient constantly on a tension. The precise character of the discomfort is not always capable of analysis by patients, and they are often unable to explain why they dislike the automatic mallet, but if this matter be carefully watched by the operator he will soon ascertain that there is invariably an intuitive flinching on the part of the patient whenever the pressure of the plugger is prolonged beyond the ordinary. It seems to be this interval of suspense which is trying to the patient more than the actual blow. All of this is avoided by the hand mallet. There is no advance pressure to herald the coming blow, and the character of the stroke is short, sharp, decisive, and instantly over with.

This recalls one feature of an automatic which would seem to have an important bearing on its utility. The stroke should be as short as possible consistent with volume of blow. Most automatic mallets have so long a stroke that their manipulation is a slow and awkward process, besides adding materially to the element of discomfort. An automatic, to do the best service capable of such an instrument, should work with a short, snappy blow, definite in quality and with a rapid rebound, so as never to miss a stroke. To attain this the appliance must be kept in the most perfect condition by repeated cleansing and oiling.

The Rapid Mallets.

Each of the various forms of rapid mallets has its adherents among operators, but probably the ones most in use to-day are the mechanical or pneumatic mallets operated by the engine or by a motor. The electric mallet seems largely to have been displaced in recent years by others more readily kept under control and less complicated. It would seem that the ideal rapid mallet was one which, besides giving a definite blow at any desired speed, may be run by the motor. To operate a mallet with the foot engine becomes wearisome in a long sitting.

The only places suited for a rapid mallet are in cavities ready of access, where it is merely a matter of laying on the gold, and also for finishing the surfaces of fillings after the inaccessible parts of the cavity have been filled. It is hazardous to attempt to build gold around corners or to reach difficult positions with the rapid mallet. Such an effort usually results in bridging the gold over spaces, and fails in perfect protection of cavity walls in the inaccessible regions.

It is often an agreeable change for the patient to have the rapid mallet substituted for the hand or automatic mallet as the filling nears completion. Any diversion in the character of the blow seems to afford relief from the monotony of a long sitting, and to be more acceptable to most patients than the continued use of any one kind of blow throughout the entire filling. For this purpose the rapid mallet becomes very useful, and it also materially shortens the operation. Gold may be condensed on an accessible surface almost as rapidly as the pellets can be carried to the tooth and placed by the assistant. This mallet also leaves a surface even and dense, if its manipulation be well understood.

The proper method of using a rapid mallet is to sweep the plugger point across the surface of the filling from center to margin, as if the gold were being wiped into the cavity. The process is entirely different from that of the hand or automatic mallet, and this fact should be recognized by those who attempt to use it.

As before intimated, oval-faced pluggers with shallow serrations are indicated for the rapid mallet, whereby the gold may be wiped down on the filling instead of being caught by the side of the plugger and torn off laterally, as would be likely to result with a flat-faced plugger having a sharp angle between the serrated end and the shank. Another advantage of oval-faced pluggers relates to the safety of enamel margins. The rapid mallet carrying a plugger with sharp angles is exceedingly prone to chop up or pulverize the margins unless the greatest care is exercised, but the oval-faced pluggers will permit greater freedom of action without injury. This watchful care of the enamel margins is one of the necessary precautions in the use of any rapid mallet, and no operator should attempt to use such an appliance without due appreciation of its dangers in this respect.

HAND PRESSURE.

If an operator were rigidly confined to any one process for the insertion of gold, it is probable that he would do better service for his patient in the varying conditions presented in the mouth by the use of hand pressure than by any other one method, and yet the places where hand pressure is properly indicated are comparatively limited. The great bulk of our work is better accomplished by mallet force, but in those occasional locations demanding hand pressure there seems to be nothing else which will at all adequately take its place. In distal cavities in molars and bicuspids there is often a certain region which cannot be reached by a direct blow of the mallet, and unless the operator recognizes this fact and resorts to hand pressure in building up the filling at these points he will fail of perfect protection to the cavity walls. These inaccessible locations are usually represented by the wall of the cavity which stands nearest to the operator, or, in other words, whose face is presented away from the operator so that it cannot be seen except with a mirror.

For instance, in a disto-occlusal cavity on a right lower molar the buccal wall of the cavity can seldom be seen by the unaided eye, and the relation of the operator to this wall is such that direct mallet force against it is impossible. In a case like this the only certain means of securing adaptation of the gold to the wall is by the use of right-angle pluggers wielded by hand pressure. When these cavities are on the distal surfaces of teeth far back in the mouth, or where the muscles of the lips are tense and unyielding, it is often necessary to build the entire cervical third—or even half—of the filling by hand pressure.

The right-angle mallets devised as a substitute in the various cases indicated are useful in the hands of some operators under certain conditions, but it would seem impossible to get so accurate a placing of the gold by their use as by hand pressure. The gold can be "pulled" against inaccessible places or insinuated under overhanging walls where such conditions are encountered with greater precision by hand pressure than by any mallet force. The pluggers used for the purpose should have a very stiff shank with a large handle, capable of being conveniently grasped in the palm, by which means most of the pulling force is best exerted. In order to be assured of perfect adaptation and an adequate degree of density with hand pressure, it is necessary to exert considerable force, and the plugger should be strong and rigid and the wall sufficiently thick to safely sustain this force. This recalls a certain mistaken idea which appears to be prevalent among operators as to the indications for and against hand pressure. The impression would seem to prevail that hand pressure is indicated when building along frail walls or over friable enamel. The exact contrary is the fact. No operator can with hand pressure secure the same degree of density or adaptation along weak walls that can safely be obtained by delicate blows of the mallet. This is particularly true of the hand mallet wielded by a trained assistant.

One place where hand pressure is useful relates to the starting of all fillings. This can be readily accomplished on the wedging principle with non-cohesive gold, and the first pieces of cohesive gold may also be carried to place and fastened into the structure of the non-cohesive to the best advantage with hand pressure. For this purpose a certain manner of manipulating the plugger should be observed, in order to obtain the most perfect results. It is seldom that a straight pushing or pulling force will prove as effective as will the same degree of force exerted with a wrist movement whereby the point of the plugger is held on the gold and the end of the handle is swayed back and forth so as to describe the short arc of a circle. If a right-angle plugger is being used, the swaying should occur at the angle. This insinuating spreading force accomplishes two objects: it carries the gold into every inequality in the wall of the cavity, securing perfect adaptation, and the swaying motion also presses the uncondensed portion of the pellet which has curled up around the shank away from the plugger, allowing the instrument to be withdrawn without carrying the pellet with it.

This same method of manipulation is very effective when for any reason not apparent to the operator a pellet of gold fails to adhere to the surface of the filling under mallet force. A rebellious pellet may be fastened to the filling by hand pressure exerted as just indicated, and made to remain more securely than by mallet force. The rocking motion of the plugger insinuates the substance of the loose pellet into the structure of the condensed gold and pins it to place to better advantage than if the mere property of surface cohesion were the sole dependence. For this purpose a plugger point with clean-cut, sharp serrations is indicated, and after several pieces have been added to the filling in this way it should be followed by the mallet over the surface to insure uniformity of density.

It may be here stated that a more satisfactory wearing surface can be given to any filling with mallet force than is possible with hand pressure, though hand pressure fillings properly inserted usually succeed in saving the teeth. They do so by reason of good adaptation to the cavity walls, thus preventing leakage, even in many cases where the wearing surface of the filling becomes pitted and unsatisfactory. No filling which is subjected to the attrition of mastication should be considered safe, so far as the condition of its surface is concerned, unless the mallet has been employed in finishing the filling to impart a resisting property to the gold.

Protection to the Peridental Membrane in Malleting.

The problem of securing sufficient density to a gold filling so that it may safely withstand the usage to which it is subjected in the mouth without causing too much punishment to the peridental membrane during the operation, is one which confronts the practitioner on approaching any cavity of considerable size. The peridental membrane is more or less elastic, and when a blow is struck on the tooth with a mallet the tooth is forced slightly into the alveolus, causing a compression of the membrane. Instantly following this impact the membrane reasserts itself, forcing the tooth out again to its original position. Another blow drives it against the membrane once more, and the membrane again reacts. This repeated forcing in and out of the tooth soon results in such impairment of the membrane that if the process is kept up sufficiently long without protection the operator is finally pounding the tooth on a jellied membrane.

This stage of injury is reached much sooner in those cases where the teeth have recently been wedged apart and are correspondingly loose, and this one factor becomes an important consideration in the choice of methods for gaining space as between previous wedging and the use of a separator. Wherever sufficient space can be safely gained with a separator it will ordinarily result in less aggregate discomfort to the patient than will the process of previous wedging followed by an operation while the tooth is still loose. One important office of the separator is to hold the tooth firmly against movement under the impact of the mallet, and it may often be profitably employed during an operation for this purpose alone in cases where space has previously been gained by wedging. In those instances where it has been necessary to wedge extensively, thus causing so great a movement of the teeth that they are left loose and sore, the operation of filling should invariably be deferred till the soreness subsides. The teeth may be held apart during this interval with gutta-percha.

The whole problem of protecting the membrane against injury from mallet force relates to giving the tooth such support that it is held firmly and immovably under the blow. This may be accomplished in various ways, each case suggesting the method most suited to itself. Sometimes a wooden wedge may be used for this purpose, or a separator as already indicated, but for an extended operation the surest means is to hold an instrument in the left hand braced firmly against the tooth or filling throughout the operation. This kind of support is especially indicated as the filling nears completion on account of the tendency to soreness at that time, and also because the surface of the filling requires the most thorough malleting to be assured of adequate density. If a tooth be protected in this way the membrane will ordinarily not rebel against mallet force sufficient to condense gold into a serviceable filling, except in those cases where the membrane is impaired or is hypersensitive. When a tooth is loose from absorption of the alveolar process or from inflammation of the soft parts surrounding it, a gold filling of any size should not be attempted in it till the tooth is made firm by treatment. If it cannot be made firm the operator would better select some other filling-material.

In some instances the peridental membrane is so weakened through lack of use that it is painfully responsive to mallet force. This is ordinarily brought about by the fact that when caries occurs the tooth becomes sensitive to mastication, and the patient involuntarily avoids its use to the end that the membrane, lacking its normal functional exercise, deteriorates in its resistive qualities so as to quickly rebel against the mallet. The remedy for this condition lies in subjecting the tooth to masticatory usage in advance of the operation, by placing in the cavity a gutta-percha plug to control the sensitiveness and instructing the patient to bring the tooth into active service. In this way the membrane may be so toughened in a week or ten days as to receive the impact of the mallet comfortably.

Another consideration connected with the toleration of the membrane to mallet force relates to the direction in which the pressure is brought to bear upon the tooth. If the condensation of the gold take place in line with the length of the root, it will be found that there is less soreness than where an equal force is exerted against the tooth laterally. With this idea in mind, all fillings requiring extended malleting should be so built, if possible, that the pellets of gold are laid at right angles to the long axis of the tooth and the plugger held parallel with this axis. When a blow is struck in this direction the force is distributed throughout the entire surface of the membrane instead of being exerted against only one side of the root, as would result if a blow were struck at right angles to any of the axial surfaces. There are, of course, instances where lateral force must be employed, but these are usually in fillings of limited area where the aggregate mallet force is not sufficient to leave any serious impress upon the membrane.

(To be continued.)

A PLEA FOR THE MAINTENANCE OF HIGH PRELIMINARY EDUCATIONAL REQUIREMENTS.

BY JOHN I. HART, D.D.S., NEW YORK, N. Y.,

PROFESSOR OPERATIVE DENTISTRY, DENTAL PATHOLOGY, AND THERAPEUTICS, NEW YORK DENTAL SCHOOL.

(Read before the Eighth District Dental Society of the State of New York.)

For more than a century New York state has taken a lead in fostering advanced education. This work it accomplishes through the aid of her university, which presides over all of the educational institutions. The growth of these interests has been especially marked since 1889. Within this decade, though the increase in attendance in our public elementary schools has been less than twenty per cent., there has been an increase of more than one hundred per cent. in the number completing requirements for admission to the high school, and more than two hundred per cent. in the case of high school graduates. By setting the standard for graduation from the elementary schools, and by providing teachers for these schools, the university has been a potent factor in improving the whole school system. In the medical schools of New York are nearly one-fifth of all the medical students of the United States, in her law schools are nearly one-fourth of all the number of law students, while in the dental schools there are 511 students out of a total of 6460 in the United States, or about eight per cent.

Having stated these facts, were my case presented to a court of law I should, without fear of defeat, ask and expect a decision in my favor; but I desire not only to drive home the bolt, but also to rivet it so firmly that no break is possible, and, even at the risk of wearying you, continue. The argument is often advanced that because such men as Woofendale, Baker, Lemaire, Greenwood, Gardette, Hayden, Parmly, Spooner, Harris, Foster, Brown, Maynard, Richardson, Garretson, and many others made such names for themselves and did so much for their profession, the added requirements of the present time are unnecessary and burdensome. No one honors these men more than I; nobody realizes more than I that they succeeded in spite of their disadvantages, and not because of them. Difficulties make a man keener, according to the principles of the old adage, "the survival of the fittest." Once these fathers of dentistry reached a certain goal they were bound to prosper professionally and practically; but, having placed the profession of their adoption on a high plane, it is for those who follow not only to maintain it, but, with the motto "Excelsior" on its banner, to leave no stone unturned to promote its elevation. I consider this a duty we owe not only to those who have gone, but to those who are about to enter the ranks; and, moreover, the educated public demands it. Recognizing the demand, if we fail to place our graduates on a high plane of professional excellence we turn them out to starve instead of giving them their fair chance of success. The public is assuming its own dignified right to be critical; not only for self-protection, but because it is proud of the scientific advances of the guardians of its physical welfare, through which the highway to better and more wholesome living is opened. The argument, then, that because a comparatively low standard was sufficient in past days the principle it promulgates is sufficient for the present, is as fallacious as that of the silver fanatic who proclaims that the "dollars of our daddies" are good enough for him, forgetting that financial economics prove him false.

Because we have made such rapid strides in our profession we must not be egotistical; we have but to turn our eyes to other fields to see that what we have done is only what others are doing; because we combine in our field so many collateral arts and sciences we are appropriating the ideas of modern education, and the only reason we have for self-glorification is that we have applied these ideas to dentistry.

From my standpoint as a teacher, which may appear selfish, I hope the standard at present existing will not only be maintained, but in its proper time attain the point it reached more than a year ago. If you only knew how much easier it is to teach students who have received a high preliminary education you would immediately realize that every state exacting high requirements benefits its schools, even though temporarily the attendance is reduced. Such students are more capable of receiving the broader, more comprehensive, and scientific truths of dentistry, which now necessitates a comparatively broad knowledge of general medicine and surgery. I firmly believe when students are prepared to study dentistry,—and I mean preparation in its broadest sense, technically and manually,—that the time will have come when they will take their M.D. with all that that means, and finally and incidentally take their D.D.S. When that time arrives the puerility of some of our discussions will become eliminated from our transactions, and we will be in a position to do the greatest good to the largest number. It is extremely unfortunate that the various standards in the several states are not in accordance with that of our own, and if the National Dental Association accomplishes nothing else than to formulate and succeed in securing one standard of admission and of graduation, so that an alumnus from a recognized college will be able to practice in any part of this fair and broad land, then it will have erected a monument indeed to its own glorification and to the mutual interests of our profession. The aphorism that "no chain is stronger than its weakest link" applies to us; if we are to deserve the respect of our contemporaries we must rise above mediocrity, and we will be judged by our average standard and not by the attainments of a few bright lights.

CORRESPONDENCE.

PORCELAIN FILLINGS.

TO THE EDITOR OF THE DENTAL COSMOS:

Sir,—I have just read Dr. Head's article on porcelain fillings in the February issue of the DENTAL COSMOS and the discussion which followed it, and although I have for some time been at work on a series of illustrated papers in which I shall try to cover the entire ground of porcelain work, I am moved by the above-mentioned paper and discussion to write a few words at the present moment for the benefit of those just beginning this artistic method of restoring the teeth.

Dr. Head's paper is, in my opinion, the best we have had on the subject, and this letter is chiefly to indorse and emphasize several important points which he makes. The first and most important point of all in this work is the preparation of the cavity, and on this feature of the operation I have not yet seen any method advised quite like that which I follow. I began experimenting with porcelain inlays with the introduction of the Downie outfit, and from the outset I followed the same general plan in the preparation of cavities, especially those on the approximal surfaces of the upper incisors, which I have practiced for many years in filling with gold. In a large majority of instances I cut the palatal wall of the cavity entirely away. Generally this wall is more or less broken, and nearly always it is frail. I therefore cut it away freely, preserving the front of the tooth to the greatest possible extent, and do all of the work from behind or from the palatal aspect of the tooth. By this method there is generally little difficulty in so shaping the cavity that the gold impression is easily dislodged. Having adapted the gold and trimmed the margins, the little gold dish or tray is replaced in the cavity, and, *while in position, filled nearly full of a high fusing body*, just as described by Dr. J. Bond Littig. I have followed this plan for several months, and it is quite surprising how it simplifies the matter of removing the gold form and prevents it from changing shape. This high fusing body (I am now using the set of high fusing bodies supplied me by Messrs. Ash & Sons) is then baked in the electric furnace after investing in asbestos. The investment is placed in a little shallow platinum dish and put in the mouth of the furnace, and the heat turned on. In about two minutes the investment is dry and, the interior of the furnace being now at a dull red heat, the platinum dish with the investment is pushed in and the door closed. In exactly five minutes the body has just commenced to fuse, at which point I remove it, cool quickly, and replace in the cavity and very carefully reburnish the edges of the gold. It is now removed, and body added nearly to contour and invested and baked a second time. Then a *low fusing* body is added to complete contour and give the proper glazed enamel finish. This last body requires only three minutes for melting. Proceeding in this way, there is no difficulty in getting the most perfect contour and the finished work is much stronger, as Dr. Head and Dr. Littig say, than it is possible to get with a low fusing porcelain. The electric furnace is so much superior to any gas furnace that any one who has used the former will never be satisfied with the latter.

What is now needed is the best set of six or seven colors of a high fusing body, just within the melting power of a small electric furnace, that can be produced, and ten or twelve shades of a lower fusing body to give glaze or enamel finish. There should be a much larger proportion of the light yellow and white bodies than of the others, as Dr. Head suggests, and, finally, the outfit should be offered at a reasonable price. The materials which I have suggested, together with the few working instruments needed and a small electric furnace, could be supplied at from twenty-five to thirty dollars and leave a large profit for the manufacturer. This work has come to stay, and the manufacturers should lose no time in giving us the best possible materials for it.

J. LEON WILLIAMS.

LONDON, February 16, 1899.

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PROCEEDINGS OF SOCIETIES.

NEW YORK ODONTOLOGICAL SOCIETY.

THE thirty-second anniversary meeting of the New York Odontological Society was held on the afternoon and evening of January 17, 1899, at the amphitheater of the New York Academy of Medicine, New York city.

AFTERNOON MEETING.

Dr. S. G. PERRY, president of the society, called the meeting to order.

Dr. J. LEON WILLIAMS, of London, was to have read a paper on "Certain Controversial Questions and Unsolved Problems in Dental Histology and Pathology," but owing to illness, he was not able to be present. A letter was read by Dr. W. W. Walker, in which Dr. Williams stated that after finishing the two papers for this occasion, and purchasing steamer tickets to come to this country, he was compelled to give up the journey, long and close application to his studies, combined with constant daily practice at the chair, having so preyed upon his health that his physician ordered him to Switzerland, where he is at present recuperating.

Dr. E. C. Kirk, of Philadelphia, kindly consented to read the paper and explain the micro-photographs thrown upon the screen.

Dr. KIRK. Mr. President and gentlemen, this is my first appearance in public as a phonograph, and inasmuch as the record which I am about to convey to you came into my hands only an hour ago, I will beg your indulgence for any lack of smooth working of the machinery which that fact may cause. The title, as Dr. Williams has written it, is "A Contribution to the Bacteriology of the Human Mouth."*

Discussion.

Dr. W. C. BARRETT, of Buffalo. I fully appreciate the compliment which is paid me in asking me to open the discussion, but it is almost a mockery for one who has known nothing of what the paper was to be, who had no conception that he would be called upon, and who has bestowed no more thought upon it than I have, to attempt to speak at all. It is of such a character in its depth and technicality, it is so occult as to demand intimate knowledge and deep research, for which I have had no opportunity, and simply to utter platitudes and commonplaces is an insult to the intelligence of such an audience as this. It is worthy of more consideration than can possibly be given to it at this time. As for unmeaning compliments, it is worse than mockery for one like me to attempt to commend the paper of a man like Dr. Williams.

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*For the paper in full, see page 317 of the current number.

We cannot at first reading follow so technical a paper and be sure that we get the proper conception of the ideas which the essayist desires to convey. One thing that was somewhat new to me was that Leptothrix buccalis, with the streptococci and the pyogenic microbes, should be considered as acid-producing organisms. We have not usually written them so; and yet, unless I am mistaken, he says that after a certain length of time they assume an acid reaction. I can readily comprehend that would happen from a non-acid producing organism when there has been time for still further degeneration; and yet with Dr. Williams's careful and accurate scientific methods of investigation, I cannot conceive it possible for a strange organism to infect his cultures and produce an acid reaction that was not originally in the medium itself. It seems very strange to me that leptothrix should be considered an acid-producing organism. And unless there is an acid, which Dr. Miller originally showed us is that which decomposes the calcified matter, I cannot conceive that it could be a bacterium or organism of decay.

I read Dr. Truman's notes upon a former paper, and I am very sorry, as undoubtedly you all are, that he is not here. I am of the opinion that he will not be completely convinced,—certainly not entirely silenced. He has clear-cut ideas, and when he once has them thoroughly digested in his mind it is very difficult to change them. I am inclined to think that his belief, as presented in the *International Dental Journal*, was so fully formulated and so reduced to a system in his own conception that he will not now be entirely silenced.

Leptothrix buccalis is a familiar organism, and has been known for a long time. That which is spoken of as Leptothrix buccalis racemosa is entirely new to me. I do not comprehend what is the differentiation which Dr. Williams intended. He has either not fully explained it, or else not fully comprehended it; but what seemed to me one of the most interesting things presented this afternoon was the breaking up into spore formations of Buccalis innominata. I never saw anything so beautifully presented; and yet I desire to have it explained. We know that in certain stages of their life history the bacteria pass through that of spore formation. This is true, even of those which usually proliferate by fissation or gemmation. Do Dr. Williams's beautiful preparations simply illustrate this stage? That cannot be his intention, or surely he would not distinguish them as a different species. It is most unfortunate that the author of the paper cannot be present to make these things clear and to answer questions. It is in commendation of the paper when I say that there are some points I must think over and study very closely before I can accept his interpretation of them. If I can, I shall have learned an infinite deal. If from having only heard the paper once read I have misconceived some of its points, then an apology is due its distinguished author, which under the circumstances should be readily accepted.

I am sorry that it is not in my power more intelligently to discuss the paper and to consider the real merits of it. It deserves far more time and thought than I have given to it, but, Mr. President, every particle of original work is precious. I have listened all my life to simple variations of the same ideas,—the same old story,—and I thank God that I can attend a dental meeting now almost anywhere and get new conceptions. A man might come almost from the ends of the earth to listen to this paper, and feel himself amply repaid for the expenditure of time and money which such a journey must entail.

Dr. A. W. Harlan, of Chicago. Dr. Barrett has expressed my views somewhat in acknowledging his incompetence to discuss this paper off-hand. As I looked at the pictures, and heard the paper read, and saw the gradual development of a heretofore common organism deputed for another work and apparently developing into another engine of destruction in the human mouth, I could not help but think that perhaps many of our views on this and other subjects would be revolutionized in this way by other workers. I only need to say that I thoroughly appreciate this paper. I came from Chicago to do honor to the writer of it, and I am sorry he could not be here.

Two prominent thoughts caught my attention and clung to me instantly as they were uttered. One was, that after Dr. Williams had cleaned his own mouth, and used silk, picks, and powerful germicides, he was still able to discover the Leptothrix racemosa on his teeth. Now, if we have to rebuild our whole system of disinfection in consequence of this discovery and elaboration of a hitherto innocent micro-organism, we must begin entirely anew.

The second thought that struck me was that this organism, which, under certain constant and never varying circumstances, is a non-acid producing organism, with the impetus of the addition of a one per cent. glucose solution immediately or very soon thereafter becomes an acid-producing organism. That thought is almost too immense for our comprehension on such short notice.

This will perhaps have a still further tendency to cause a reconstruction of our knowledge of the germicidal action of drugs and other agencies used for disinfection. If there were nothing else in the paper, it would be well worth the journey from Chicago to New York to hear these two thoughts uttered.

Dr. S. A. Hopkins, of Boston. The paper is filled with such good matter and has brought so many new ideas to my mind that I am very glad to say a few words about it, and corroborate what has been said of its excellence. I have been thinking of the differences of opinion that seemed to occupy the minds of Dr. Truman and Dr. Williams, and it seemed to me that they were not quite so real as they were imaginary.

I think the difference in opinion started from the observation of Dr. Black, that caries was due to environment alone, and it rather upset the ideas of practical dentists to feel that there was no difference in the structure of teeth upon which caries could depend, or which could modify the action of agents that produce caries.

Now, it seems to me that the differences of opinion are not entirely irreconcilable. I think that instead of speaking of "normal teeth" and "degenerate teeth," as Dr. Black and Dr. Williams have done, the terms "susceptibility" and "immunity" might be used.

We know that throughout the rest of the body it is impossible to tell by any microscopic test, by any chemical analysis, or specific gravity test the differences that exist between the organs of different people. The lungs of two different people, for instance, may not differ when subjected to such tests, yet one person is susceptible to lung trouble while the other person cannot get it if he tries. It is a difference of immunity and susceptibility, and while the teeth may not differ perceptibly in their chemical analysis or their specific gravity, yet the difference is there, and is so subtle that it cannot be determined in the ordinary way.

With that explanation, I think the two opinions may be reconciled. I am able to speak with some little confidence on the assertion of Dr. Williams that the Staphylococcus pyogenes aureus is an acid-producer in sugar bouillon. The bouillon I have used is two per cent., while he speaks of one per cent. I do not think a micro-organism worth considering until it can be isolated and studied in pure culture; that is, for the purpose of producing caries. I have thirty pure cultures of thirty mouth forms, eight of which I am sure produce acid, and if any one is interested in bacteriological work, and is working on the same lines, I should be very glad to furnish him with the cultures that I have found to produce acid, or indeed any other cultures, so that we may work in different parts of the world on the same subjects and get along much faster.

I want to say one thing in regard to the production of caries. Of course, this work has been carried on with the idea of finding some means of prevention. I think that perhaps Koch's laws have been somewhat lost sight of in some of the work that has been done. Koch, if you remember, laid down three distinct laws regarding disease ascribed to a micro-organism: that a particular form of bacteria should be constantly present, that it should be grown as a pure culture, and that with a pure culture the disease should be produced. Not until these conditions had been fulfilled could we ascribe to that particular form the cause of the disease. These conditions, I believe, have never been carried out in regard to caries. Caries has been produced artificially, but it has not been produced artificially, so far as I have been able to get any reliable testimony, by a single culture of any mouth form that we have found. It is possible that it may never be found, because some of the mouth forms fail to develop on any artificial media known.

I think this work on the leptothrix is one of the most interesting pieces of scientific work I have yet seen. I was surprised to hear the leptothrix form spoken of as an acid-producing form, and perhaps I may have misunderstood. I was surprised for this reason: I think that, so far as we know, no one has yet succeeded in cultivating the leptothrix as a pure culture. We get cover-glass preparations from the mouth where it is constantly found, and we stain it, and are able to study it in that way; but I think nobody has yet succeeded in cultivating it, and so it seems to me that this acid-producing power can scarcely be determined until some suitable medium has been found on which it can be cultivated and studied as a pure culture.

Dr. KIRK. It seems to me that this presentation is one which is not discussible. I would not attempt to do such a thing; it is a step forward into new fields, and in order to intelligently discuss it one must have had an opportunity to go with the explorer, or to reproduce his experiments.

There were two features with which I suppose we have all been struck. One, already alluded to, is the acid-forming power of these leptothrix fungi, and also the reasons which were given to account for the difference in the character of their reaction. If these be true, of course the converse is true,—that micro-organisms of a given class may be nourished by different kinds of pabula.

I do not know how widely that particular principle as a generalization has been worked out, but if it is a generalization capable of wide application it would be interesting to know whether the bacteria concerned in the decalcification of the hard structures of the teeth limit their action to the destruction of that material, or whether after decalcification is completed their action is continued in the destruction of the organic matrix.

It would seem to indicate a possibility that it was not necessary that different classes of organisms are needed to perform these different kinds of work.

Another feature has already been referred to, but it should be discussed further. Dr. Williams says, "I have invariably found a greater amount in mouths which are comparatively healthy than in those which exhibit some specific form of disease." I do not know whether this has been noticed before or not, but it seems to me to be a significant fact. It indicates a manifestation of the natural law that these lower orders of organic forms are, like all others in the scale of life, directly subject to the forces of their environment. Not only are the forms constituting the mixed infections in the average mouth the fortunate survivors of an internecine strife, one class being antagonistic to another in many instances, but the question of susceptibility to an invasion by this particular class of micro-organisms is undoubtedly a condition of the organism itself,—the human organism. There is a factor of immunity which we can recognize and which we should cultivate; that is, the vital resistance of the individual, and I believe it applies in cases of infection of the teeth by the micro-organisms of caries just as much as to infections of any other part of the body.

Dr. B. HOLLY SMITH, of Baltimore. Mr. President, if the Executive Committee of this association expected any commendation for having secured this paper from Dr. Williams, it seems to me that the breathless silence and eagerness with which every word was drunk in by this large audience must have shown the feelings of appreciation and of compliment to that committee; and when we know that thousands of men who could not afford to come here and listen to the words are waiting with eagerness to read them when they are published, this society is certainly to be congratulated that they have succeeded in getting Dr. Williams's effort on this occasion.

I must say that I am no bacteriologist, and I regret that I am not able therefore to properly appreciate this paper, which I have no doubt will be helpful to our profession. However, it has been a subject of interest to me to pick up that suggestion of Dr. Kirk's as to the antagonism which develops in all forms of life.

We have all observed with surprise the absence of caries in mouths affected with pyorrhea, even though carelessness or positive uncleanliness is the habit of the patient, and the structural changes which have taken place in the soft parts favor accumulations of food and offer inviting sites for caries, yet the disease is not present in that virulence which the conditions would seem to warrant.

In the identification of these bacterial forms by the essayist, and this record of the study he has made of them, we are helped to a greater familiarity with their life processes, and it may develop, if we should learn to cultivate the different varieties out of the mouth, that the forms present in pyorrhea are antagonistic to those responsible for caries. By a careful study of the chemistry as well as bacteriology of mouths affected with pyorrhea an environment might be simulated like to that existing in pyorrhea, which would as effectively prevent caries as does inoculation prevent certain diseases.

Dr. BARRETT. Did we understand the paper to say that an organism might be so changed in its character by the pabulum, or the medium in which it was proliferated, that it may from a benignant become a malignant one?

Dr. KIRK. I did not understand the paper to go as far as that. They are remarkably influenced by their environment, so that the reaction of their waste products may be reversed, but I did not understand the author to assert that a benign form might be changed into a pathogenic form.

Dr. HENRY S. NASH. It has been a great pleasure to me to be here this afternoon. I followed the reading of Dr. Williams's paper with the most intense interest. But the thought occurred to me, meanwhile, that in investigating the malignancy of bacteria we should not only examine them by themselves, but as they are influenced by their surroundings, nourishment, antiseptics, etc. Now we have just been told that some of these bacteria are not acid-producing ones at all unless their environment contains a slight amount of saccharine matter. This is a matter of great importance, one which has led to much misconception. One authority says the leptothrix and certain micrococci are not acid-producers; another declares them to be such, provided their surroundings are as stated.

As for the presence of some form of sugar in the mouth, it is probably more prevalent than most of us are aware. We know that we introduce it with fruit, berries, and confectionery, but it is formed, to a certain extent, from the bits of starchy food which remain between the teeth and in their sulci, by means of the digestive ferment ptyalin. This is secreted by the endothelial cells of the salivary ducts and at once attacks any amylaceous substances with which it comes in contact, unless some acid is present which destroys it, as also does sugar itself after it has passed the first stage of its formation.

These starchy bits are changed by ptyalin to dextrin. Upon this taking place they undoubtedly may affect the nature of the secretions of certain bacteria.

When amylaceous food is swallowed the ptyalin is destroyed by the hydrochloric acid of the gastric secretion, and its further change into dextrose, or grape sugar, is occasioned by the amylopsin of the pancreatic juice and the bile. In this form it enters the circulation and is finally stored away in the myxomatous tissue as fat, or in the liver as glycogen, or is consumed in effecting excretory changes among the products of metabolism.

We have, therefore, the conditions necessary for the development of the leptothrix, and other bacteria, into acid-producing ones, much more commonly at hand than might be supposed unless our attention has been called to all the facts in the case.

Dr. Wm. Jarvie. I want to express my great disappointment that so many gentlemen whom we had hoped to have with us are kept away by that fell demon of this part of the world, la grippe. In the first place, our essayist himself could not be here; then the president mentioned the names of three gentlemen who were to discuss the paper, and I have no doubt that a great many others would have been present but for that same reason. I am sure that all who are here feel that we have gotten something from this paper, even those who know nothing of bacteriology, but who have the practical, every-day experience at the operating chair, and who desire to keep the teeth of patients as free from decay as possible, not only by remedying the ravages of decay that has already taken place, but preventing that decay from beginning. In the paper to-day we have some points which will help us to do that, and I think we can see a little more clearly the great necessity for extreme care in regard to cleanliness.

Dr. Williams has told us that after cleansing between the teeth with water, using dentifrice, silk, and germicides, and apparently getting the surfaces of these teeth as clean as it was possible to get them, eight hours afterward he found upon these same surfaces a mass of such bacteria as he has shown us upon the screen. I wish he had carried his experiments a little further and given us the condition of this surface in one, two, three, four, five, six, and seven hours, as well as in eight. We might then have a little better idea of how long these carefully cleaned surfaces were immune from bacteria.

Dr. R. OTTOLENGUI. I think Dr. Williams says forty-eight hours.

Dr. JARVIE. Possibly; then, if he found bacteria forty-eight hours after cleaning, he might not have found them after twenty-four; or even if he found them after twenty-four, he might not have found them after twelve or eight. Clean the teeth carefully, thoroughly, and we may be able to keep them free from bacteria by cleaning once in eight or twelve hours. This is the point which I carry home with me from this paper,—a point that I have always made, perhaps the strongest of any since I began the practice of dentistry,—with your patients insist upon as near absolute cleanliness as possible. The nearer we approach absolute cleanliness, the less decay we will have.

Dr. BARRETT. I still contend that I have not yet had a clear and comprehensive answer as to whether or not the paper did assert that the change of the menstruum, the addition of glucose to the medium in which it was cultivated, could change the nature of a bacterium from a non-producing acid to an acid-producer.

It is a very essential question. If that is possible, then a microbe or a bacterium which is merely parasitic may change to one which is pathogenic. It seems to me a very important point, and I wish I could know what the ideas of the author are on that subject.

Is it possible that the tiger can be fed upon cabbages until his vegetable diet shall induce him to forsake his predaceous proclivities and he shall eat grass like the lamb? I hardly think it.

From the remarks of some of the gentlemen here it would seem that the addition of glucose to the medium may so modify the character of leptothrix, that from a non-acid producing form it produces acid. That I am not willing to admit.

Dr. HOPKINS. I think I can answer that question in the affirmative. Let me say that I do not answer it in regard to leptothrix, because I do not think that any assertion can safely be made in regard to the acid-producing powers of the leptothrix forms. Until we are able to obtain the forms in pure culture, we cannot know whether it is an acid-producer or not. As long as we do not know every mouth form we do not know but that the acid may be produced by the leptothrix. It is true, however, of several mouth forms that they produce acid in starchy or saccharine media,—that is, bouillon to which sugar has been added; whereas, in plain bouillon they produce no acid reaction.

Dr. BARRETT. There are few organisms existing in the mouth that will proliferate without sugar.

Dr. HOPKINS. Those forms are not common, I think. Of course the media that are most used are the solid culture media, blood serum especially, and only a few forms will liquefy this substance. The best test is to cultivate these organisms in litmus milk. By adding a little litmus to sterilized milk, all you have to do is to transfer a pure culture to the milk, and then the color begins to change by the production of the acid that is formed. That is one way to determine the acid-producing form, but there are some forms that will not grow in milk and still produce acid.

Dr. BARRETT. I think you said that no pure cultures had been made of an organism which produced caries in the teeth.

Dr. HOPKINS. I stated that caries of the teeth in its varied steps had not been produced by a single pure culture. I do not think that Miller has ever claimed to produce it by a pure culture of one form of micro-organism. I have studied Miller pretty closely, and I do not remember that assertion anywhere.

Dr. KIRK. I am very much surprised to hear a question raised as to whether the bacteria of dental caries have ever been cultivated in pure culture. It seems to me the crucial point in Miller's remarkable investigation depended upon the very fact that he had isolated these, and had reproduced the disease in pure cultures.

Dr. HOPKINS. I am afraid I am misunderstood; I did not mean to say that Miller had not made pure cultures of organisms that might produce caries. I did say that I have nowhere seen it asserted by Miller or by any one else that the laws of Koch had been fulfilled; that the cultures obtained from the mouth had been made pure by methods of cultivation, and that the disease had been produced by these pure cultures. I think I have not read Miller wrongly, and I do not think that he claims this. I have never heard that Miller or anybody else claimed that the disease was produced in that way, or that Koch's laws were fulfilled. If we knew that we would know the exact process of caries, and could watch every step of it. That is the one thing that limits our knowledge.

Dr. BARRETT. I have in my possession eight or ten slides given me by Miller. They are at my house in Buffalo, and if I comprehend anything, it is that these were the first demonstrations of artificial caries. I have the original slides, and I repeat that if I can comprehend at all, true caries was thus produced artificially, through infection from an oral culture. I most emphatically affirm that Miller has told me that he has traced caries to the action of one single microbe,—the Delta organism of Miller,—although he does not affirm that this is the only one that may induce it.

Dr. KIRK. And he has told me the same thing, Mr. Chairman, if I can trust my memory. I think the result of the research is embodied in his book, and republished in part in the "American System of Dentistry." He did prepare pure cultures, and did reproduce the disease caries. Further, he isolated the particular acid concerned in the action and determined its character.

Dr. J. E. HINKINS, of Chicago. Dr. York, of Chicago, reviewed all Dr. Miller's work carefully, and I am of the same opinion that Dr. Hopkins is. I do not know any place in Dr. Miller's work where it might be understood that he had obtained pure cultures. I may be mistaken.

Dr. BARRETT. I know Dr. York very well, and I know his good work; but can I have been so mistaken in my conception of the very basis upon which Dr. Miller's grand discovery rests, that bacteria are not the products of infection, but the cause? That they are not due to disease, but that they induce it? For years and years we debated the question, Are bacteria the result of infection, or are they that which causes infection? and until Dr. Miller's demonstration,—the production of acid from bacteria and its bringing about a pathological condition,—neither medicine nor dentistry nor science at large was able to decide the problem. The assertion that Professor W. D. Miller, who is accepted as an authority by the whole scientific world, that he of all men never made a pure culture, that he was so utterly unscientific as to accept the results of mixed infections for those of a special organism, fairly takes my breath away. Why, even I, who delight in sitting at the feet of this Gamaliel—even such a tyro as I would know better than that. I can most solemnly assure the gentleman that the average practicing dentist is more intelligent than that comes to.

Dr. HINKINS. I think in Dr. Miller's first work he did make that statement, but in his later work, and in some correspondence which Dr. York had with him, he changed his first statement. He first made the statement, and then withdrew it.

The president announced the evening session, and, upon motion, the meeting adjourned.

EVENING MEETING.

The meeting was called to order by the president, Dr. Perry, at 8 o'clock P.M.

In the absence of Dr. Williams, Dr. A. W. HARLAN, of Chicago, kindly consented to read the paper, the title of which is, "Which Shall It Be, the Empirical or the Scientific Method?"*

Discussion.

Dr. E. C. KIRK. I want to felicitate you, Mr. President, and the gentlemen present, that the fair goddess of science in dentistry has found so eloquent an advocate as Dr. Williams. I have listened with the utmost care and attention to every word that has been uttered, and there was not one sentiment expressed which I cannot heartily and cordially approve. I have for some years been hammering away in my own humble manner at this very topic, and I have had the hope that a scientific interest might grow up and become general among practitioners of dentistry. I have hoped that a realization of the importance of the scientific method would dawn upon the minds of the so-called practical men in dentistry.

I have a great deal of sympathy for and interest in the position of the so-called practical men, but I believe the time will come when this practical man, with his ideas, will see that the most practical thing we have is science,—practical because it is true.

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*Published in full in the DENTAL COSMOS for March, page 201.

That is all there is to it. We have had an exposition of that fact in the paper of this afternoon. I would not add a word to the paper; I could not, because it has been better said than I can possibly say it.

As a matter of simple detail, I do take exception to the graceful ease with which the problem of the oxyphosphate of zinc was disposed of. That very ground has been carefully gone over, and there is no problem in practical dentistry that requires more elaborate investigation than the one of oxyphosphate cement. It is one of the most puzzling problems in dentistry.

I have nothing but commendation for the paper, and it is a source of great happiness to me that it has been presented.

Dr. W. C. BARRETT. I had my say so freely this afternoon that I scarcely feel like responding to the invitation of the president and inflicting myself again upon the same audience. And yet I must say that I suppose I shall blush in my sleep when I dream about some of the facts presented in this paper. It is such a complete reflection of the weakness, the shallowness, the incompleteness of too much of our scientific study, that as the glass is held up before me and I see the reflection of my own image in it, I shrink back shuddering as from a nightmare fantasy.

We have been wont to call ourselves a scientific body, and to vaunt our scientific achievements. The essayist has simply shown something of what are our scientific attainments when he points to the publication of Miller's book and cites the number of copies sold. We all praise the work, as the essayist says; but who has studied it? How many have purchased it? Everybody says, "I have the work," but the publishers say the edition remains on their shelves.

We must awaken to the fact that applied science is not pure science; that pseudo-science is not demonstrable law; that clinical experience, as we interpret it, is not scientific fact or scientific evidence. We must comprehend that our wonderful professional growth, that has in so brief a time organized a great and broad professional practice out of the rankest empiricism, is but professional knowledge and not scientific advancement.

We point with pardonable pride to the results of our professional observation,—to the principles which we flatter ourselves are immutably established by the teachings of our practice. We principally rest our claims to recognition as a learned profession, or as a branch of a learned profession, upon the knowledge that is the consequence of long professional experience. We forget that this is not real scientific demonstration. Facts may be of themselves indisputable, but our interpretation of them may be so insensibly warped by the personality of the individual, through natural bias or educational predisposition, that clinical observation may be perverted into evidence that is naught,—that is even confusing and misleading.

The essayist is a master of declamation. He is a rhetorician of the very first order, and that is why he can place the picture before us in such vivid colors. And yet, at the same time, I think I can see that he is not always logical, because at the conclusion of a denunciatory flight he recommends the very thing which in the earlier portions of the paper he had pronounced unreliable. He seems now to cite clinical experience for interpretation of scientific facts.

I think the latter portion of the paper rather contradicts the first; and yet, O gentlemen, brothers mine! members of the profession which I love and which I have served in my own weak way as best I could for so many years, we are not what we vaunt ourselves to be, and we never will rise to the limit, we never will rise to the plane of the ground we should occupy until we recognize some of these facts.

I have an admiration and feel a love for such a paper, even though it may rap me across the knuckles. I need it, and it will do me good; and I know it will do you good if you recognize the likeness and feel that you yourselves are painted there. Such papers as this, which wake us up, which set our minds on fire, which rouse our enthusiasm, I do not care from whence they come, are most beneficial. They impart the spirit, the enthusiasm of their authors, and imbue us with a little of their own aspirations for that which is higher, nobler, better.

Go down with me into yonder dark stithy and watch the blacksmith as he toils amid the smut and the dirt. How uninviting looks the cold, lifeless, unresponsive iron. How repulsive the black forge with its smudge and soot. That great lumbering bellows seems but to cumber the scene. But the sinewy arm of the stout smith moves its lever, and there is breathed into the darkest point of the forge the breath that gives life. The heavenly flame leaps from point to point, and the glow of the morning begins to light up the darkness. The black coals assume the tints of the glorious sunrise. More forcibly moves the brawny arm that governs the lever, more deep the breath of the throbbing bellows, and soon the fierce heat bursts forth and illumines all the scene around. Into the heart of the newly engendered life the smith thrusts the heavy, dead iron, while the deep pulsations of the bellows continue. And now he draws it forth, all glowing with the burning force and energy which it has absorbed from the life-giving flame of that so recently smutty forge.

I care not how black may be the picture the essayist paints, so only there be the kindling spark of truth and actuality which, like the smith, we may fan into the flame that shall purge away the dross; the fire within our bones that shall set our souls aflame with the burning desire for yet higher attainments; that shall enable us to thrust into it our sluggish, insensible, and vainglorious conceptions, and see their impurities burned away, and our better natures emerge glowing with energy and intensity, all ready to impart to our brethren the vigor we have ourselves received.

Dr. S. A. Hopkins. I wondered as I sat here and thought of the afternoon meeting, and the reception that was given to Dr. Williams's paper, whether, if Dr. Williams had been here this afternoon and had read that paper himself and had heard the enthusiasm with which it was received, whether under those circumstances he would have read the paper to-night without expurgating it! It seems to me that there has been an injustice done to the dental profession. I do not think that there is any body of men on the face of the globe, if I may judge by the gentlemen who were here this afternoon and who are present this evening, who are more willing to receive scientific truths, more eager to grasp them, and who come farther to receive them, than the dental profession. I do not think that they can be scored on that subject. I think the danger is that they are too ready to receive with attention the conclusions of scientists, which frequently the scientist himself is obliged to change at a future time.

The history of scientific work has been a slow process of evolution, and no one man has known it all. The most that any of us can hope to do in science is to make the work easier for some one that comes after. We cannot solve the whole problem, but the dental profession is a very good judge of the value of scientific work.

If a man comes before this society and suggests a proposition, if that proposition is not well received, if the suggestions are not followed, I think there is something wrong with the suggestions and not with the profession.

Dr. L. D. SHEPARD, of Boston. As I look back over my experience in the profession I am inclined to take an optimistic rather than a pessimistic view of the condition of things at present, and of the hope of the future. I believe all that the essayist has said, but I further believe as we survey decade after decade of the past forty years, the progress has been so marked, the intelligence and education of the mass of the profession has been to such an extent upward, that we should not take to ourselves quite the despondent view which he has taken. It is true that the original investigator does not travel over a smooth road, and he does not receive the encouragement that he should. I should like to see five hundred of our profession contributing from the abundance of the results of their practical work to form a fund for the carrying out of these investigations, and I believe, perhaps as a result of this essay, something of the kind may be done.

But we have to rely for progress in every department of life, not only in our own peculiar calling, but in all others, upon the few who have been so imbued with love for their fellows, or with love for truth, that they have been willing and eager and happy to burn the midnight oil for the benefit of others, without receiving or seeing the recognition of their work.

To men like Dr. Williams, like Dr. Andrews, and many others who have done so much work, I bow my head, and admit that they are better men than I; but I cannot see that we should condemn the profession, or that we should look upon the dark side, because there are not more of them, and because the progress is not more rapid than it is.

The younger men cannot of course look back to the state of the profession twenty or thirty years ago; but those of us who can are filled with hope for the future. The great advance in education of the mass of the profession will enable us before many years to see the realization of the picture which has been presented to us to-night for the future of our profession.

Dr. A. W. Harlan, of Chicago. I would like to say that in reading this paper to-night for Dr. Williams, I tried as far as possible to emphasize the things that I think he would have emphasized. In following the thought of the paper, it occurred to me that nearly all of the work that has been done in medicine, chemistry, law, and theology has been done unrecompensed, except in the way of giving prizes for studies on particular subjects. I have a great feeling of faith in the future of the dental profession, and I believe we are educating a better class of men now in our dental colleges, so that we will have in future years in proportion to our numbers just as much and as good and as accurate scientific work as is done by other professions.

The author of the paper perhaps feels that scientific work is not appreciated at its full worth. I know that is apt to be the case, because many men in presenting even two or three pages of printed matter have had to spend weeks and months in order to get the results, and the man who sits and listens for a brief fifteen minutes may appear to be indifferent; but those truths and the results of that work sink deep into his mind, perhaps to come out in years after; it has made its impress, and it is the multiplicity of this kind of recorded scientific observation and experiments that makes us a profession as a whole.

Dr. John B. Rich. It has been my experience that papers of this kind have been of the greatest possible service to our profession. It is rather bitter on the profession in some points of it, and perhaps Dr. Williams does not recognize the immense advance that has been made in a very short period. If he could go back to the time when I entered the profession, and realize the immense strides that have since taken place, he would understand better, perhaps, how they have grasped, as opportunity offered, anything in the way of scientific fact that would assist them in their work.

When I became a dentist, sixty-two years ago, there were in the city of New York eight or ten men who were skillful in their way; the rest were all charlatans and cheats of the worst kind. Now look at the profession in this city alone, to say nothing about the whole United States, and see the immense advance that has been made. This profession has absolutely been created in that time, and become a scientific one. I do not think Dr. Williams realizes that fact, from some parts of his discourse.

We have given this profession to the whole world, because there were no dentists in any of the old countries. The profession in all other parts of the world did not amount to anything, and we have achieved all that in the short period of seventy-five or eighty years. We ought to be gratified at that, and I hardly think we deserve the great reproach that has been given us in that paper.

Dr. R. Ottolengui. Dr. Rich and Dr. Hopkins have claimed that the dentists have been ever ready to grasp with avidity anything that might be of use to them. I do not think Dr. Williams denies that. There is little doubt that the dental balloon is soaring high, and that the car is crowded with men who are gaily waving flags, but only a few men have furnished the gas. Dr. Williams makes a plea that some of these riders should put down the flags, take off their coats and go to work, and make gas that will fill other balloons and tempt other men to higher flights.

The paper contains the germ of progress. The seed has fallen; will it take root, will it sprout, will it fructify? I think, gentlemen, that will depend very largely upon the soil upon which it falls. Dr. Hopkins tells us that he believes from the reception of the paper this afternoon, and from the reception of this paper to-night, this audience will take advantage of all that is offered. I fear that the doctor is optimistic. This is not the first meeting of this character that I have attended. This is not the first opportunity that has been offered to the dental profession to go forward. I will only mention two instances. Dr. Kells, of New Orleans, sent a communication to the DENTAL COSMOS suggesting the establishment of a fund for scientific investigation, and offering to contribute thereto. I think his name is the only one on the list at the present time. The New York State Dental Society passed a resolution that it would donate five hundred dollars to this fund, and a wise financial economist added that the money should be paid over when the fund was raised; so it was a safe resolution to pass.

Some months ago the Institute of Stomatology had a very full meeting, in which the various gentlemen who spoke advocated an independent dental journal. The idea was received with fully as much, if not more, applause, than the papers that have been read here to-day; in fact, the enthusiasm for the enterprise was so dense one might have carved his monogram on it. On that occasion I was the pessimist who pointed out some of the obstacles in the way, but I offered to be one of five hundred gentlemen to give ten dollars per year each to support such a journal. I believe I have the honor to be the sole member of that list.

The same principle applies here to-night. We think that all that Dr. Williams has advised is good, but will we take the advice? Are there ten gentlemen in this room who will band together for scientific investigation, giving their spare time for one year, and giving fifty dollars each and take up one of the suggestions offered, so that the seed will bear fruit? Or, to put the proposition in another way: Dr. Williams has sent this paper to the world through this society, which has, let us say, one hundred members. Will these one hundred men be willing for the next year to abandon their meetings and permit their annual dues to go into a fund, and sit down for a year without meetings, that they may have one good meeting at the end? If so, there will be fruit, and I should be glad to have a slice of it.

DR. J. BOND LITTIG. I am convinced of one fact in connection with this matter,—that it makes no difference what is proposed, there would be some one who would rise up and object to it, and therefore do not see that I could advance this matter at all.

We should not expect this profession to be like a mushroom,—to spring up in a day or in a night. It has advanced rapidly within my memory, and I think its growth probably is as rapid as its health would permit. As it grows slowly, gradually, we get at the matter more firmly and more completely, and I think we can be encouraged at the success that is going on and taking place every year.

Dr. O. E. HILL. This is certainly a grand paper, and it comes from a man who is one of those leaders who are necessary to all professions.

Dr. Williams's paper is certainly very much in advance of the dental profession. Ever since I entered it there has been one cry,—that we must advance. In the last thirty years, what (except electricity, perhaps) has gone ahead faster than we have? There is not another profession that I can call to mind that has taken the rapid strides that we have. This paper does not discourage me at all. I certainly am glad to have heard it.

Dr. JAMES MCMANUS, of Hartford, Conn. I have enjoyed the paper very much. I have listened to it intently, and I desire to call attention to one fact, that the American Dental Association for some years past has spent quite a nice sum of money to pay for investigations. During the last twelve years alone of its existence sums amounting to over six thousand dollars were expended. If the coming men of the profession would take an interest in society matters, would join the National Association, pay their dues and enlarge that association, and have the National Association consist of at least five hundred members, there would be money in the treasury of that association to pay for scientific investigation in many different directions.

Two years ago, when I listened to Dr. Williams's paper here, and this afternoon and to-night, I have felt, What has the profession done to compensate Dr. Williams for his hard labor? We thank him in words only, but I would like to be one among the members of this society who would, with others, send to Dr. Williams some souvenir that should constantly remind him of the appreciation we have for the work he has done for this society and the profession.

Dr. HENRY S. NASH. In listening to this brilliant and timely address this evening, it occurred to me that our profession will never reach the position it should hold with the allied ones, or with the public, unless much greater care is taken in the matter of introducing new members into it than is the rule everywhere among us.

Every applicant for admission to any dental college in the country should be required to present a certificate from his own State Board of Examiners that, as the result of their own investigations, they know him to be possessed of these qualifications, viz: His personal and family antecedents should be unexceptionable; his education of an advanced character; his eyesight perfect and his technical ability—his manual skill—of the very highest order, as decided by actual tests. Until we attend to these things in all the states we are not fulfilling our duty to the public, which confides in us, and we may expect to see the profession of dental surgery prostituted to base ends by enough of its members to reflect discredit upon the calling as a whole.

Dr. W. G. A. Bonwill. Mr. President, while I could not hear Dr. Williams's paper, I read it over hastily, and saw enough. I shall detain you but a few moments. I wrote an article upon the subject of patents, which will be published very shortly. Inasmuch as I am one of the chief offenders in regard to this, of course I ought to have something to say. While I have been abused by some, I have been treated most leniently by others. I have tried to do my duty. I shall not attempt to defend myself further than to say that my conscience approves of this course. When my paper is published you will see exactly what I have to say upon it.

Dr. B. Holly Smith, of Baltimore. Mr. President, I cannot begin to accept this paper seriously. I am amused and interested at the versatility of the essayist's character. The tall, gigantic form which bestrode the canvas this afternoon seems to have assumed the amusing character of the caricaturist.

I really do not believe that Dr. Williams meant seriously all that he said. I receive this paper as helpful to me; the chiding stimulates energy and ambition that possibly may develop in my own life healthy enterprise, if they do no good to my profession.

I would say, with Dr. Williams, that to-day dentistry would be poor indeed if we did not have such noble men, such scientific men, such God-given men as Black and Williams and Miller; but with those who have spoken before I also agree that in the few short years that dentistry has been struggling as a profession it has far outstripped many of the professions that have labored by its side.

I do not believe there is a college connected with our profession where the names of Black and Williams and Miller are not household words; I do not believe there is a college where the teachings of this grand trio are not daily arrayed before the students, who drink in eagerly almost every experiment and theory that they have presented to the profession.

I believe that the time has come when the profession of dentistry should take a hopeful rather than a gloomy view, and I do not think Dr. Williams meant seriously except to chide us.

The fact is this: his paper of two years ago and the matter that we received here to-night might have been discussed more intelligently, and I have no doubt he has been discouraged by the apparent indifference with which his scientific research has been received. I think it has been due to accident or mismanagement. I do not believe Dr. Williams has been fairly treated in this matter, and I believe he brought this subject up simply that he might have the privilege to be on more intimate terms with his professional brethren. I am sorry that he is not here so that we might rub against him, and he against us, and so come to a better understanding.

Dr. C. A. Brackett, of Newport. I would like very briefly to express a gratification, a conviction, and a hope. I was gratified at the tenor of the paper with reference to the legitimacy of compensation for the inventor and the investigator. The expressions of the essayist concerning those things appear to me to be forceful and in accord with good logic and good sense.

My conviction is that it is a very great waste and misapplication of human effort for men like Miller and Black and Williams, who have the disposition, the talent, and the capacity for scientific investigation, to be bound down to the routine of ordinary dental practice. It was my supposition that Dr. Miller at the time he made most of his investigations with micro-organisms devoted himself almost exclusively for two years to bacteriological laboratory work. I was assured during the past summer by a resident of Berlin that such was not the case, that he had been engaged all along very busily in the practice of dentistry, and that this great work which he did for us he did as an extra labor. Such things ought not to be. It is just as wrong for men of that class to do work at the chair as it would be wrong for prominent operators in dentistry to spend their time in the extraction of teeth. The world's best work is done through sub-division by individuals who have capacity in special lines.

Now this is the hope: that it may somehow be made practical in the years not very far in the future for the men who have the capacity to do the work of special original investigation to be employed in doing it, be paid for doing it, and with exemption from ordinary tasks which may be done by ordinary men. Most of us are lacking in some particular or circumstance needful for doing such special work. We are very willing to go on in our ordinary routine of practice, and to have this scientific work done for us. If it can be made a practical thing to have it done for us in accord with the sound principles of the economy of the sub-division of labor, and for suitable compensation, it will be a very great improvement upon the methods of the past and the present.

Dr. Barrett. I would like to express my dissent to that. Had Dr. Williams not been in the actual practice of dentistry he would not have been in sympathy with the principles which he desired to examine, and the scientific study which he desired to pursue.

Dr. Wms. Donnally, of Washington, D. C. It would not be modest in me to advise a line of effort based on the lessons of the admirable paper, but I may be permitted to offer a suggestion for the consideration of this society. References are frequently made to the fact that the exigencies of private practice forbid the pursuit of tedious research,—that other professions favor more than ours the development of the spirit of investigation. If we turn to the average medical practitioner we will find the conditions not unlike our own in this respect, but, taking the medical profession as a whole, the idea of favoring investigation is exemplified because their investigators of scientific problems—those who do the tedious laboratory research—are generally men who are lifted above the bread and butter problem through the aid of the government or endowed institutions. Experts in medical subjects are employed in almost every department of the general government.

Those from civil life so employed have practically a life tenure, while for those in the three medical corps—the army, the navy, and the Marine Hospital Corps—there is, besides a tenure to old age, a constantly increasing rank and pay, with comfortable annuities after the age of retirement is reached. The value to the medical profession of the government can scarcely be estimated. They are recognized authorities on many practical subjects, not only on marine, naval, and military medical matters, such as hygiene, sanitation, epidemic diseases, etc., but on the subjects recognized as fundamental to a broad medical education.

My suggestion is this: We should claim for our specialty a place in every department where a corps of medical experts is organized. In the army medical museum there are experts from civil life to supplement the work of army medical men. Here, where the whole field of medicine is essayed, is especially needed an expert in dental subjects, a need we hope to have supplied very soon. Other bureaus cover special fields, as comparative odontology by the National Museum. The Agricultural Department has its medical and veterinary experts, who cover that part of the field of dental science pertaining to domestic animals. But there is not a single dentist employed in such work by the government.

Wisely directed effort would gain for our profession some share in the advantages enjoyed in this line by the medical and other professions.

Adjournment.

W. J. TURNER, M.D., D.D.S.,
Editor New York Odontological Society.

AMERICAN DENTAL SOCIETY OF EUROPE.

(Continued from page 297.)

SECOND DAY—*Afternoon Session.*

THE meeting was called to order at 3 o'clock.

Dr. W. E. CHRISTENSEN read a paper, entitled "The Half-Cap Crown," which was published in full in the DENTAL COSMOS for December, 1898, page 981.

Discussion.

Dr. W. MITCHELL. With regard to this method of crowning, it is not entirely a novel process. I had a little experience with it about fourteen or fifteen years ago, and I would say, in regard to the application of the facing to the end of the root, it is impossible to make a clean and perfect adaptation.

Dr. CHRISTENSEN. No; only on the back half.

Dr. W. MITCHELL. That is the weak point, I contend, with crowns of that kind; you cannot make close apposition, and if you use cement, which you should not use, it will wash out sooner or later and promote the formation of a receptacle that is very unpleasant. I have made a good many crowns on this principle, but the results were unsatisfactory. My first experience, of course, was with the Richmond crown, which promoted two things, causing the band to become painfully in evidence through cutting the dental ligament, and causing recession of the gum. With banded crowns you get recession of the gum or elongation of the root, and to obviate that I went in for this method; and I found it had the objection of not being able to make a close fitting onto the root, and the result was the cement washed away and you got an unhealthy condition of affairs, owing to the decomposition of food that invariably took place. To get around that difficulty I gradually used a crown with a platinum plate, just to cover the root, and I find I can get a more perfect apposition with a platinum plate on the root than by any other means; and by setting the crown with pink gutta-percha, in case of an accident, you do not have to worry your patient for an hour or two in trying to remove the pin; you warm it up and the thing comes away, and you can repair it and make your patient comfortable in a short time. The only disadvantage is the plate. Of course, if you set the crown with gutta-percha you get a much better result than with cement. There is really no need of a band or a partial band, according to my experience, except in very faulty roots.

Dr. C. J. MONK. I would ask Dr. Mitchell if there is any difference between the crown he refers to and the Derby crown?

Dr. MITCHELL. I don't think I know it. I'll give you a sketch of what I mean. [Illustrates.] Here is the root; it is necessary to take off the enamel. Instead of cutting it straight across, I have it beveled so as to have the joint well under the gum. There is the facing. If you prefer to do away with the backing, run the pin up. If you have the vertical pins, you can bend one each way; if you have parallel pins, bend them both around and solder with pure gold; back it up with porcelain, and you have the advantage of having a translucent tooth when you have done. It is one of the plainest and simplest crowns to make that I know of. You simply trim off the root, fit the pin, make the plate, push it down on the pin where you want it, put a little wax on if necessary; invest it if necessary,—I seldom find it necessary. I solder the pin to the plate over a Bunsen burner, then fit the tooth to it on the plate in the mouth; fasten with sticky wax; invest it in order to solder,—that is the longest part of the operation,—and you then get a crown that is cleanly and exceedingly satisfactory.

Dr. MONK. I do not know whether we are to look upon Dr. Mitchell's remarks as criticism or as an exposition of a particular kind of crown. But it seems to me to wander somewhat from the point. I would like some member of longer experience than myself to have mentioned if there were not some disadvantages in Dr. Christensen's crown, inasmuch as there seems to me to be a great danger of having no resistance to the bite in the front,—whether the question of the bite would not eventually weaken that and render the root just as liable to break off from the front part. The back part is the strongest part. I do not see that there is any more necessity for building up the back part with gold than the front, which is the weaker part.

Dr. CHRISTENSEN. The bite is forced from behind. We are speaking of ordinary cases.

Dr. MONK. I should say with no band you get a much better hold by having your crown faced doubly.

Dr. GORDON WHITE. I think that Dr. Christensen stated in his paper that it was next to impossible to get a perfect-fitting band; if so, I should like to say that I think he is mistaken.

Dr. CHRISTENSEN. I did not state that. I said it is very difficult to get.

Dr. WHITE. It is just as difficult to get a perfect half band. I should like to say that I have made that crown many times; but I make an entire band in order that my half band may fit, and then grind it entirely away in front.

Dr. BRYAN. I am surprised to hear my friend Dr. Christensen say that is his crown. That used to be made at the dental college when I was a student, at least twenty years ago. Why he should claim that as his crown I do not know. The subject does not seem to me to have anything further in it necessary to discuss, and I therefore move that we proceed to the consideration of the next paper.

Dr. CHRISTENSEN. I should like to answer the last remark. I did not claim it to be my crown. I said I believed my idea to be the idea of many; but it has no official, no general recognition. You do not find it in any book. [Cries of "Oh, yes, yes!"] Anyhow, I do not claim it as my crown; I said I believed it to be the idea of many, but I do not find that it has any general recognition.

Dr. CUNNINGHAM. I think our friend Bryan has been unnecessarily hard upon the reader of the paper. I think he put the question very clearly in the summary, and I have no doubt he did in the preliminary part, but I was not here to hear it. It is obvious we must have a variety of methods. I think those who have had much experience in crown-work do utilize at times this operation, and I think the remarks made by the last speaker but one were away from the point. We must admit that every time we get away from a complete band it is a question of mechanism, and the question is, Is it strong enough? The principle is that it is absolutely necessary to band a root with a barrel hoop; that is the strongest form. The objection to any other plan—we will say such a crown as demonstrated by Dr. Mitchell—is that you get off the root. I won't take up some of the other points. I think Dr. Mitchell has contributed enough material for us to spend the rest of the afternoon in discussing. I think we have to thank our friend Dr. Christensen for the very interesting paper and specimens.

The CHAIRMAN. If there are no more remarks on the last paper I will call upon Dr. Schaffner to give us his paper on "Some Hints on the Manipulation of Pulp-Canal Probes."

Dr. H. L. SCHAFFNER. Mr. President and Gentlemen, a great deal has already been said and written on the preparation and disinfection of pulp-canals. Every conscientious operator is aware of the importance of the correct manipulation of such passages; everybody dreads the evil resulting from the retention of dead pulp remnants, and seeks for the best means for their removal. I think it is the opinion of every one that there is still a good deal of guess-work connected with this branch of dentistry. And, to come to the particular point I wish to draw your attention to, I shall discard any canal in which the remnants of the pulp have still life enough to be kept aseptic, or rather have so recently been removed that no decomposition has yet taken place. In either case our efforts, if well directed, will give us positive results. Such is not the case when the pulp has been destroyed at a period exceeding six weeks, and has been allowed to gradually decompose. The contents of the canals in these cases are highly fetid, and if they are not carefully removed or thoroughly disinfected they will become a dangerous agent and be the cause of failures, if not worse, when a subsequent operation is attempted. I have not yet reached my point. We therefore all admit that great thoroughness and skill in the opening of such canals is essential, and the more thoroughly it is done the better the result. Disinfectants are so numerous and so reliable that the latter part of the process, *provided time is granted*, is no guess-work.

For years, when any trouble arose during treatment of a root, I always attributed the cause of it to too rapid sealing, thinking that the pressure caused by the accumulated gases caused the pain by driving some of the said septic matter beyond the apex of the root. No doubt that is often the case, but there is another cause which I believe has been underrated by the dental profession in general, and to which the majority of our failures are due. These cases are the result of our own efforts to clear the *débris*, and the first sitting is always the one during which risks are the greatest. In the course of your practice will it not often occur to you that while probing, particularly with fine instruments, you caused your patient not precisely to jump, but to give a slight call, as if to warn you that something sensitive had been encountered? You thought it was a remnant of the pulp and paid little attention to it, but what was your surprise when the next or following day the patient returned with a swollen face. The tooth had been comfortable for years; the cavity had not been too tightly sealed: all possible antiseptic precautions had been taken, and yet evidently inoculation had taken place. Who was to be blamed? Yourself. It was your probe that did it. Though it did not literally go through the apex of the root, it had enough power, acting as a hydraulic pump, to break asunder the cicatricial tissue that isolated the contents of the pulp-canal and send them into the surrounding tissues.

What is it that gives way? It is the pericemental membrane or the cicatricial tissue at the apex of the root. What that cicatricial tissue is, or what resistance it can offer, that I have not been able to ascertain (our literature is a blank on the subject), but, judging from the facility with which we can inflict pain and the enormous power we have at our disposition, it is certain that we unconsciously do a great deal of mischief. According to the length of our stroke, more or less septic matter is sent through the foramen into the adjoining tissue. The evil effect of this I do not need to mention here, but simply that the intensity of the toxic effect varies according to the length of time the contents of the root have been in contact with the disinfectant, and the strength of it. A long stroke at the very first, when opening a narrow passage, will be disastrous, but if it should take place after the second or third application of a reliable disinfectant the evil effects of it will be minimized to a great degree, while a short stroke will hardly be noticeable and leave but a soreness.

I think I have said enough to show that we are responsible for the way we manipulate pulp-canals, and that our attention and efforts, as well as the way our instruments are made, ought to be directed to obtain as low a percentage of failures as possible. We must remember that at all times we are liable to produce the lesions I have just alluded to, and that this may even happen when we fill the cavity or set a pivot tooth in; the pressure is always considerable. Before applying power we must use our own judgment as to the sufficient penetration of a germicide, and remember that the more tortuous the passage is, the longer it must remain to render the contents aseptic. After that, should an accident take place and your instrument penetrate deeper than you wished, there will be little toxic action.

I shall bring at our next clinic, for your examination, a set of instruments with rigid and relatively long handles, which permit the operator to preserve at all times his sense of touch. The instrument can be taken in and out of the canal without any extra resistance caused by the bending of the wire, while the strong but light handle, offering a good leverage, prevents a sudden plunge. My last experiments have been made with an articulated probe, so that any desirable angle can be obtained. The revolving disk carrying the point can be locked firmly if desired, or removed rapidly for finger use or for the purpose of changing.

Discussion.

Dr. L. A. O'Brian. My ideas are diametrically opposite to those of Dr. Schaffner. I could not imagine that I could take a nerve-probe in a handle as large as that and have the same sensitive feeling as if I had it in my fingers. I judge, looking at that drawing, that Dr. Schaffner makes a direct in and out movement in the canal with his instrument in the manipulation, which I never do. I use a very fine nerve-probe, insert it slowly into the canal, rotating it in my fingers, and never going to the end of the root with a direct plunge; and I think that would obviate the point Dr. Schaffner brings forward as causing the irritation. If a fine probe is used in that way and rotated, you feel almost instantly if you touch a membrane.

Dr. Schaffner. The same instrument can be used for both purposes. But how would you clear the roots when it is a question of getting into the anterior root of a second or third molar? You cannot use the fingers there; you cannot introduce two fingers into the mouth.

Dr. O'Brian. I can with the rotating movement. If you have the slightest blocking of that instrument, you feel it much sooner with the fingers than through the handle.

Dr. Cunningham. I think there are points to be said for both speakers. It might satisfy Dr. O'Brian to know that I would rather use an instrument with a crook. One of the exercises we have had at the Institute of Dental Technology is the making of an instrument for the purpose. You remember the Cogswell mirror, where by a screw you can move the mirror in any direction. We have applied that principle, and you can put in with a screw the Donaldson bristle. There is an instrument sold with a number of screws, but these screws interfere with the sight. For that purpose we found that such an instrument as that [illustrating], by means of the screw, can be put in any corner you like; so much so that you can insert a Donaldson bristle, and it is an excellent instrument for that purpose. With regard to Dr. Schaffner's paper, there is a great deal of talk about the condition of the roots. If you take a root-canal containing a large amount of septic matter you simply take a probe and you put that through, and you very frequently find the contents like a worm at the end, like that which you get out of a collapsible paint-tube. We must, in our efforts to cleanse the tooth, frequently find that occur. What we really do is, we thrust the pulp-canal contents into the area beyond. I do not myself believe that you get beyond the apex of the root so often as Dr. Schaffner thinks.

Dr. Schaffner. You would have the same trouble without getting so deep; you get the same effects.

The Chairman. If there are no further remarks, we will listen to a paper of Dr. Wm. A. Spaulding on "Filling Root-Canals."

Dr. W. A. Spaulding. I prepared no paper. I have prepared a few remarks which are to explain my clinic, not for a paper. The first care of dentists when undertaking to restore one of the natural teeth is to see that the foundation upon which we are about to build is in good condition and suitable for the superstructure we are about to erect. If the foundation is imperfect, however good our building may be, it will fail. We will refer more particularly at this time to those teeth which have been suffered to decay so that the pulp is exposed and must be destroyed, or which has already become dead and perhaps putrescent. Of course, much depends upon the conditions of the tooth and its surroundings. If in the mouth of the patient whose physiological condition is below par, we cannot expect to have the same results as in a healthy mouth. In the first place, for those teeth which are devitalized I am careful not to cause unnecessary pain by the agent used or by too great a pressure in covering it. I also avoid leaving the nerve-paste in a tooth longer than twenty-four hours, in order that this may not become so filled with the arsenic as to affect the periosteum around the root. I prefer to have some sensitiveness when I remove the devitalized pulp. When the pulp is destroyed I seal the cavity, and in four or five days remove the pulp, and, if in the mouth of a healthy person, fill the root. The simple and ordinary canals of easy access are not generally the ones we have the most trouble with. The tooth with a dead and putrescent pulp must be handled with great care, lest the *débris* of the broken-down tissue be forced through the apex. When thoroughly cleansed I use iodin and aconite, pumping it in to be sure it goes to the end of the canal; then I follow with a rope of cotton saturated at the end with oil of cloves. This I pack into the canal as tightly as possible, absorbing the excess of oil and filling with gutta-percha for a week, but with instructions to the patient that if soreness follows he is to return at once. If at the next sitting there is no soreness on percussion, and the odor indicates a healthy condition in the canal, I proceed to fill. I find the end of the canal by means of a fine broach, and note the length. Then, passing the end of my canal instrument through a very small piece of rubber, marking the length of the canal or the depth I may carry the instrument in safety, I then roll upon the end of a perfectly smooth instrument a few fibers of cotton so loosely that it will easily slip from the instrument; and, after wiping out the canals with iodin and aconite thoroughly to the end, I insert the instrument and cotton and oil of cloves and pack it tightly in the end of the canal, this to prevent the gutta-percha from protruding through the apex. I then wipe out and absorb the excess of liquid remaining in the canal, and dry with air. I prefer not to use the hot air, but dry with ordinary air; and insert my filling, consisting of gutta-percha points dipped in eucalyptus or chloroform, which I work and press into the canal sufficiently to allow the chloroform to evaporate, and packing the gutta-percha solid to the end. Unless that is done, unless it is packed with the heated gutta-percha after, the chloroform will evaporate, leaving a dry condition and the vacuum at the end. In those teeth where it seems exceedingly difficult to burrow out the canals or to remove the particles of dead pulp, and in exceedingly fine or crooked canals, I am pleased to say I have found the chemico-metallic method, as introduced to the profession by Dr. G. W. Weld, of New York, to be excellent, and a method we may use with benefit to ourselves and our patients. In fine and crooked canals those points will go wherever the finest broach will, and it is claimed that the chemical action of the acids will clarify the canal and thoroughly disinfect it. It is also claimed that if the point should not reach the end of the canal the *débris* and septic matter will be made antiseptic by the nitrochlorin gas eliminated. I have used these points in several cases where I would have hesitated to use any other methods, and I am pleased to say with admirable success. I have not had that chemico-metallic method sufficiently long to give it as much of a test as I should be pleased to, but I am pleased with what I have seen of it.

Dr. SJOBERG. I should be very interested to hear if any gentleman here present has tried for the treatment of root-canals the Kalium Natrium alloy, by Dr. Schreier, of Germany. I have tried it only for a few months, and to me it has appeared to be a very practical means for sterilizing root-canals. The last gentleman spoke about the chemico-metallic means which have been tried now for some time. He says that you are able by this means to fill up a canal where the finest probe enters, and I say I have been able really to penetrate and sterilize, by aid of this amalgam, canals which I could not before. I have not used it a sufficiently long time to be very sure, but I have been very pleased with it up to now; and I should be very glad to know if any other gentleman has tried it.

Dr. GORDON WHITE. A few days ago I was in Dr. Weld's office in New York, and I mentioned to him that I should sail the next day in order to attend this conference. He handed me a bicuspid which he had a few days before filled with his chemico-metallic material. I have it in my possession, and I thought if the society would like I could bring that to-morrow and see how perfectly or imperfectly it has filled those canals. Just here I should like to say that I have made some experiments with that process, and I have, I suppose, decomposed fifty points, and I have so far had not the slightest trouble with any of the teeth save one, and that was an upper molar which became sore for a couple of days. Since that time it has given no trouble. With the experiment I have been successful. I mention it because I think it is a point which might be of interest to the gentlemen here.

Dr. CHARLES E. LUCE. I will attempt to reply to a previous speaker, who asked about Dr. Schreier's potassium and sodium. I have used it for about three years, but only as a means to an end. I believe it is a very useful thing for cleansing the canals, but I would not dare trust to that treatment alone. I go a little further; and, after washing them out with hydrogen peroxid, I then treat with sodium peroxid, leaving that in for a day or two; and then I use the oil of cajuput and use metallic points. With regard to these metallic points of Dr. Weld's, I believe they are now receiving adverse criticism. It is rather an open question whether the chemical theory is carried out by facts.

Dr. CUNNINGHAM. I will ask a question which will settle the matter. Why should we use potassium or sodium? It can do nothing until it has become caustic potash; it must undergo the change, and you get the same thing; you get the formation of caustic potash. Therefore, instead of buying an expensive stuff sealed in tubes, buy caustic potash and use it.

Dr. BROPHY. I am very much interested in this matter. I see no occasion for making use of a substance in the cavity of the canal for the purpose of producing what we may call an antiseptic effect permanently. That is the rule applicable not only to dentistry but to surgery, that in order to obtain a good result we must make use of an agent that will bring about aseptic conditions. When a tooth is in a good aseptic condition it has probably to be filled, and it makes no difference what you fill it with. We have used gutta-percha for a long time, and many believe that it is a satisfactory filling. I am unable to understand the advantage of making use of a compound which is placed in there for the purpose of acting as an antiseptic permanently. If you make it aseptic nothing can get in when once it is filled; if you seal the end of the root and the cavity of the tooth, then you have cut off any access of bacteria.

The CHAIRMAN. I will now call on Dr. Cunningham to give his paper on "The Dental Aspect of Phosphorus Necrosis."

Dr. CUNNINGHAM. One feature of this question has not yet been sufficiently advanced or brought to the notice of the authorities. I think, from my experience, that that is also true as regards other countries, but certainly so far as this country is concerned. A great many years ago we had a tremendous investigation, and the great Dr. Bristowe at that time made a report for the Privy Council, in which he mentioned all the cases of the so-called phossy jaw. I believe there were six cases mentioned in the report. Since that time there has been a tremendous change. First, there has been a change in our knowledge with regard to bacteriology. Secondly, a change has taken place in what the dentist can do for the individual in the way of preventing caries. And, inasmuch as there is that other point with regard to the hygiene of the mouth, we may take it for granted there is the question of the use of yellow phosphorus. Every one thinks it is a simple thing to say, "We will use red phosphorus, and then there will be no phosphorus necrosis or phossy jaw." There is a good reason why it is a disadvantage to use red phosphorus. First, when you carry a red phosphorus match it means that you must carry something on which to strike it. Human nature demands that it shall have a strike-anywhere match. If you study human nature from a matchmaker's point of view, you will find characteristics and the habits with regard to human nature are almost identical. Here we have a band of philanthropists headed by the Baroness Burdett-Coutts, and I believe even the son of the premier and certainly Sir Walter Foster, a cabinet minister, all joined together in making a tremendous outcry, especially with regard to Bryant & May's works. Unfortunately Bryant & May, who use this yellow phosphorus, have an enormous factory, and to them it is perfectly clear that matches which would light not only on the box but anywhere would have a much larger sale. I believe they sell about thirty thousand of one to two thousand of the other. The consequence is that if the philanthropists who are working for the matchmakers have their way they will, in saving a small percentage of human suffering—which we all desire to save, and which must be saved and can be saved; but in order to do it they only see one way, and that is to get rid of the yellow phosphorus—they will simply take away the livelihood of a large number of people. I am not talking in the interest of the capitalists, and I hold no brief for Messrs. Bryant & May, but I am talking in the interests of the work for men and women. They would lose and be deprived of an employment for which they have been trained for years. All we want to do is to make it safe. On the question of hygiene, the use of yellow phosphorus may be made safe if adequate precautions are taken. The adequate precautions must first of all be with regard to hygiene and ventilation. The ventilation can be made perfect. In Bryant & May's there are points which demand correction. With regard to the hygiene of the individual, it was a long time before the matchmakers could be got to wash their hands. Now they are obliged to wash their hands before leaving their work, and also before having their meals; and they are obliged to take their meals outside the factory. The difficulty now is how to get them to clean the mouth and to attend to that. The right thing to do is to appoint qualified dental practitioners to see that there are no carious teeth. Surgeons do not understand this question of dental hygiene. The point is there should be no carious teeth in the factory, and then you will have no phosphorus necrosis. If you ask what is the difference between the bones in the face and the other bones of the body, I say none, except that they have teeth in them; and there are channels there, and a means of access by which the phosphorus can get at the material in the bone itself. Therefore if you stop up the channel and prevent the access, you would have no phossy jaw. The new books written on the pathology of the subject will be done away with, and there will be no such disease as phosphorus necrosis or phossy jaw. The men who make the phosphorus do not suffer, but the matchmaker does get the disease; and it is no different from the necrosis that occurs from other causes. Therefore I say if we stop that and cure these cases of caries, we get rid of the disease.

With regard to the economic points, which are of great importance, you can see there is something to be said, and it is an important thing to keep up this use of yellow phosphorus if it can be done with safety. I will ask those who are working in other countries where phosphorus is used, whether dentists are appointed to inspect the workers' teeth. We have had dentists appointed to the match-making factories in France. The results have not been altogether satisfactory; there have been great battles of a political character. As a matter of fact, they have only succeeded in getting an examination of the workmen's teeth by bringing in the gendarmes. The only thing they do is to make them have the teeth extracted. They call it voluntary, but to workmen it means this, you have either to have it done or you have to leave. They take out all the teeth. I submit that no state ought to permit such extraction, and there is no necessity for it. They ought to see what the dentists can do. They must be called in in a higher capacity,—namely, to prevent those conditions that demand the extraction of the teeth.

Another point with regard to hygiene. I may say this, they have succeeded in eradicating phosphorus necrosis in France in a factory heretofore having a bad reputation. They have done it by this method of extraction. At Aix they have built a new factory; they have taken in young workmen, and they have trained them in match-making; and they have a regular inspection to which no one objects to submit, and the teeth are taken care of; and I am assured that there are no persons with carious teeth allowed to work in the factory. They have been running since 1892 and they have had no phosphorus necrosis, and I do not believe they will. It is an important point; and I think you will be glad to know that our government have taken up this question, and they have regarded it from the dental point of view and not from the medical point of view.

Dr. G. C. Daboll. You are aware they are making matches in France without phosphorus?

Dr. Cunningham. Yes; they are making matches without phosphorus, but I will ask you if any Englishman will be satisfied with a match like that?

Dr. Daboll. But they are making them, and it is a better match than they made before.

Dr. Cunningham. Yes, there they are; and I have some of them in my bag. At Bryant & May's they have some now, but they are like fireworks and go off. Diseased teeth are more trouble and cause more suffering than all the accidents that occur together. But there is one thing that is absolutely certain, there are more serious burns, which of course affect the workmen, though not to that same extent as phosphorus necrosis, through the use of the red phosphorus than there are from the yellow. Another point. When you introduce a match made without yellow phosphorus that will strike anywhere, you may introduce other materials that will cause poisoning. For instance, some of the new ones contain lead, and then you get lead-poisoning. The main point I should like to know is this: I want information about the Barber match factory in America, where they have employed a dentist, Dr. Stuart I think; and they keep him the whole time to go about examining the workmen.

Dr. Brophy. I believe that the local diseases of the mouth, such as necrosis of the lower jaw, are not due so much to general conditions as to local disturbances, through immediate infection either from phosphorus or lead-poisoning or from mercury. We are in the mining district, and I have never seen any reason why it should be a systemic condition; and I am very glad Dr. Cunningham has fortified me in this opinion. In those countries there are dentists appointed to devote themselves to the care of the teeth of the people engaged in the factories. In fact, a person cannot get employment in the principal factories of the United States unless he gets a certificate from a dentist engaged for that purpose to show that his teeth are in good condition. If he refuses to do that, he is not employed. The employés are regularly examined to see that their teeth are kept in good condition, and it has been demonstrated that these conditions exist only in cases where the teeth are diseased. Some few instances are noted where the disease did exist in others, but there was some breaking down of the tissue of the mouth which made the infection more easy. I make this statement so that Dr. Cunningham may see that we have a system of examination. The Diamond match factory have a dentist who is devoting himself exclusively to the care of these people. In a paper recently prepared by Dr. Bevan, of Chicago, on this subject, he enters into it very deeply, and shows that the disease is a local one, and that it is the result of immediate infection from inhalation or the passage of the poisonous material direct to the part affected. That has been questioned, as you know, in the literature of the subject. The question of dispute even to-day is as to whether phosphorus necrosis is a disease brought about by immediate infection, or whether it is a disease due to general infection or the inhalation of the fumes of the phosphorus into the system; and still it is a question of dispute among the best authorities.

Dr. SJOBERG. As Dr. Cunningham asked us whether there were dentists appointed to the factories in the different countries, I should like to say that in Sweden, where, as you know, we have large factories, I know of only two practitioners attached to factories. The one factory has an illegal practitioner of dentistry, and the care that he gives to the teeth is of course very elementary; the other is a real dentist. I do not think that in Sweden they will accept the proposition of Dr. Cunningham as practical. I am not sure if we have yet got the law to abolish the fabrication of yellow phosphorus matches; but they have worked very hard for years, and I know that cases of necrosis are very few now. I have seen only two or three during these last few years. There are very few in Sweden, and I feel it my duty to say that in my opinion it is much more practical and much more sure to give up the fabrication of the poisonous match than to support this proposition, which is beautiful. I admire the work Dr. Cunningham tries to do in this direction as well as in others, but I do not think for Sweden that will do; they have not the means; they find it much less expensive to give up the manufacture of yellow phosphorus than to try to get good dentists. We do not propose to do away with the red phosphorus; we intend to encourage the use of that as much as possible.

(To be continued.)

VERMONT STATE DENTAL SOCIETY.

THE annual meeting of the Vermont State Dental Society was held at the Van Ness House, Burlington, March 15, 16, and 17, 1899; Dr. J. A. Robinson, of Morrisville, president, presiding. Dr. S. D. Hodge, of Burlington, made a welcoming address, which was responded to by Dr. J. A. Pearson, of Barton.

After the president's annual address, in which he advocated the work of dental societies and asked that the essays to be presented be thoroughly discussed, papers were read by Dr. A. J. Sawyer, of Manchester, N. H., on "Conscientiousness in Daily Practice," and on "Method of Anchorage in Contouring Centrals and Laterals;" Dr. E. O. Blanchard, of Randolph, on "Artistic Crown Fillings;" Dr. John Hood, of Boston, Mass., on "The Refining and Manufacturing of Gold Foil;" Dr. H. W. Northrop, of New York city, on "Hints on Crown- and Bridge-Work;" Dr. Hattie H. Moon, of Saxton's River, on "Affections of the Antrum;" Dr. P. M. Williams, of Rutland, on "Painless Extirpation of Live Pulps without

Cataphoresis;" Dr. F. B. Smith, of Stowe, on "Articulating Artificial Teeth;" Dr. J. Holmes Jackson, of Burlington, on "Gold Filling."

The officers for the ensuing year are as follows: K. L. Cleaves, Montpelier, president; H. Turrill, Rutland, and C. W. Steele, Barre, vice-presidents; Thomas Mound, Rutland, recording secretary; Grace L. Bosworth, Rutland, corresponding secretary; W. H. Munsell, Wells River, treasurer; G. W. Hoffman, White River Junction, state prosecutor; J. E. Taggart, J. A. Pearson, J. Holmes Jackson, Executive Committee.

The next annual meeting will be held at St. Johnsbury on the third Wednesday in March, 1900.

NEW ENGLAND ASSOCIATION OF DENTAL EXAMINERS.

THE third annual meeting and dinner of the New England Association was held at the Algonquin Club, in Boston, on the evening of February 16, 1899; Dr. John F. Dowsley, president of the Massachusetts Board, presiding. There were present as guests of the association Dr. L. D. Shepard, of Boston, and Dr. C. A. Brackett, of Newport. Regrets were read from Dr. C. A. Meeker, secretary of the National Association; Dr. Civilion Fones, of Connecticut, and Dr. J. Searle Hurlbut, of Massachusetts, who had hoped to be present. Great interest was taken in the object for which this association has been formed, namely, to raise the standard of examinations in New England to one of uniform requirements, and as a result two of the New England states have had their dental laws so amended as to bring them in line with their sister states. It is the ardent hope of the association that in course of time a law so nearly perfect will be enacted as to render feasible an interchange of certificates in New England. An election of officers for the ensuing year resulted in the choice of Dr. D. F. Keefe, of Providence, R. I., president; Dr. G. F. Cheney, of St. Johnsbury, Vt., vice-president; Dr. Geo. L. Parmele, of Hartford, Conn., recorder. The following ex-members of state boards were elected honorary members: Dr. C. A. Brackett, of Rhode Island; Dr. J. Searle Hurlbut, of Massachusetts; Dr. Civilion Fones, of Connecticut; Dr. L. D. Shepard, of Massachusetts; Dr. R. B. Miller, formerly of Maine, and Dr. James Lewis, of Vermont.

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DENTAL SOCIETY ANNOUNCEMENTS.

AMERICAN MEDICAL ASSOCIATION, SECTION ON STOMATOLOGY.

THE next meeting of the American Medical Association will be held in Columbus, Ohio, June 6 to 9, 1899.

The Section of Stomatology will be of unusual interest, since its program will be made up mostly, if not entirely, of original work, although the papers presented before this Section have always been of high order. Papers upon the manipulation and technique of operations and mechanical dentistry are never read at these meetings; only such subjects as are of interest to both the dental and medical professions are received. These have always been selected by the secretary with the greatest care. There is no business to transact in the Section; everything of that nature is referred to the Business Committee (composed of the last three retired chairmen of Sections), which meets every afternoon at 5 P.M. to consider the welfare of the whole association and of each Section. These matters are discussed, and, if favorably considered, are reported to the general meeting. This method relieves the Sections and general meetings of considerable routine and unnecessary work, and also gives more time for the transaction of the regular business.

On Tuesday afternoon a committee of three is appointed in each Section to nominate officers for the following year. The committee reports on Wednesday, at which time the candidates are elected. Since the offices of chairman and secretary carry no great honor, there is very little desire on the part of the members for the positions, hence politics never mar the session.

With the exception of a few years, the present secretary has been in office continuously since the Section was established, eighteen years ago. There are many advantages in having a permanent secretary, since a new chairman is elected nearly every year. A permanent secretary is familiar with the methods of conducting the Section, and knows just whom to call upon for papers, no matter in what particular part of the country the association may meet. The character of the papers is always under his supervision, and his knowledge of the workings of the general meetings as well as of his own Section enables the work to proceed without friction.

The meetings of the Section on Stomatology are never largely attended as compared with other national organizations, principally for the reason that there are no attractions except the advancement of dental science. Its members have never encouraged nor desired numbers. They have always felt that even a few good thinkers and talkers able to discuss intelligently the various papers presented were more to be desired than a large number of uninterested people.

Dentists are admitted in the same manner as physicians. Dentists holding the D.D.S. degree, upon presenting credentials from their state or local society and the payment of five dollars, can become members of the association, which also entitles them to the *Journal of the Association* for the ensuing year.

Any one who wishes to attend the sessions of the Section on Stomatology is permitted to do so.

The following list is the preliminary program of the meeting to date:

Chairman's Address, Dr. G. V. I. Brown, Milwaukee; "Actinomycosis," Dr. Ludwig Hektoen, Chicago; "Evolution of Decay" (further experiments), Dr. A. C. Hart, San Francisco; "Cocain and Eucain, their Relative Toxinity," Dr. A. H. Peck, Chicago; "Epithelial Structures in the Peridental Membrane," Dr. Frederick Noyes, Chicago; "Infectious Ulcerative Stomatitis," Dr. John S. Marshall, Chicago; "Oral Surgical Operation" (with illustrations showing remarkable results), Dr. G. V. I. Brown, Milwaukee; "Some Points on the Etiology, Pathology, and Treatment of Persistent Pyorrhea Alveolaris," Dr. G. T. Carpenter, Chicago; "Interstitial Gingivitis (so-called Pyorrhea Alveolaris), giving the result of original work, with large photographic illustrations showing the progress of the disease from beginning to the exfoliation of the teeth," Dr. Eugene S. Talbot, Chicago; "Syphilitic Infection from Dental Instruments, with Cases," Dr. W. L. Baum, Chicago; "Professional Education and Ethics," Dr. A. E. Baldwin, Chicago; papers (subjects to be announced) by Dr. M. H. Fletcher, Cincinnati, O., and Dr. L. P. Bethel, Kent, O.

G. V. I. Brown, *Chairman.*
Eugene S. Talbot, *Secretary.*

DENTAL SOCIETY OF THE STATE OF NEW YORK.

The thirty-first annual meeting of the above society will be held in Albany May 10 and 11, 1899, and the following program will be presented: President's address; report of correspondent, R. Ottolengui, M.D.S.; report of committee on practice, L. C. LeRoy, D.D.S.; essays by L. D. Shepard, M.D., D.D.S., Boston, Mass.; R. M. Sanger, D.D.S., East Orange, N. J.; Wm. Hailes, Jr., M.D., Albany; A. Retter, D.D.S., Utica.

A cordial invitation is extended to all reputable dentists to attend the meeting.

F. Le Grand Ames, *President,*
Charles S. Butler, *Secretary,*
680 Main st., Buffalo, N. Y.

UNION MEETING IN WASHINGTON.

The third tri-union meeting of the District of Columbia Dental Society, the Maryland State Dental Association, and the Virginia State Dental Association, will convene in Washington, D. C., June 7, 8, and 9, 1899, in the Dental Department of Columbian University, 1325 H street, N. W. Eminent practitioners from many states will be present to clinic and read papers. The profession cordially invited.

Jno. H. London, *Chairman Joint Ex. Committee,*
1115 G street, N. W., Washington, D. C.

FLORIDA STATE DENTAL SOCIETY.

The Florida State Dental Society will hold its sixteenth annual meeting at Jacksonville, May 2 to 4, 1899, inclusive.

A cordial invitation is extended to all members of the profession.

S. W. Allen, *President.*
C. H. Frink, *Secy.,*
Fernandina, Fla.

SIXTH DISTRICT DENTAL SOCIETY, STATE OF NEW YORK.

The thirty-first annual meeting of the Sixth District Dental Society of the State of New York will be held on Wednesday and Thursday, May 3 and 4, 1899, in Binghamton, N. Y., the place of meeting to be announced in the regular program, which will be issued before the date of the meeting.

Frederic W. McCall, *Secretary.*

NORTH CAROLINA STATE DENTAL SOCIETY.

THE next annual meeting of the North Carolina State Dental Society will be held in Raleigh, May 3, 4, and 5, 1899. The meeting promises to be of more than usual interest.

A cordial welcome will be given all visiting dentists.

Reduced railroad and hotel rates.

J. S. SPURGEON, D.D.S., *Secretary*,
Hillsboro, N. C.

OKLAHOMA DENTAL ASSOCIATION.

THE ninth annual meeting of the Oklahoma Dental Association will be held in Oklahoma City May 2, 1899. The profession is cordially invited to be present.

ELMER E. KIRKPATRICK, *Secretary*.

OKLAHOMA BOARD OF DENTAL EXAMINERS.

A MEETING of the Oklahoma Board of Dental Examiners will be held at Oklahoma City, May 2, 1899. Those holding diplomas may obtain application blanks from the secretary. Others must bring operating outfit.

ELMER E. KIRKPATRICK, *Secretary*,
Oklahoma City.

VERMONT STATE BOARD OF DENTAL EXAMINERS.

A MEETING of the Vermont State Board of Dental Examiners will be held in Montpelier, Wednesday, May 17, 1899, at 2.30 P.M., at Pavilion Hotel. Candidates must come prepared with rubber-dam, gold, and instruments to demonstrate their skill in operative dentistry.

The theoretic examination will include Anatomy, Physiology, Histology, Chemistry, Pathology, Materia Medica, Operative and Prosthetic Dentistry.

Notice of intention of taking the examination must be filed with the secretary of the board before May 10.

GEO. F. CHENEY, *Secretary*,
St. Johnsbury, Vt.

ALABAMA STATE BOARD OF DENTAL EXAMINERS.

THE Alabama State Board of Dental Examiners will meet in Anniston, Alabama, on Monday before the second Tuesday in April, 1899. All who wish to go before the board must be there on that day.

THOS. P. WHITBY, *Secretary*,
Selma, Ala.

OHIO STATE BOARD OF DENTAL EXAMINERS.

THE next meeting of the Board of Examiners of the State of Ohio will be held in Columbus, Ohio, Wednesday, May 31, 1899. All persons desiring to take the examination must make application to the secretary before May 20. Address

L. P. BETHEL, *Secretary*,
Kent, Ohio.

EDITORIAL.

DENTISTRY IN RELATION TO PUBLIC HEALTH.

AMONG dentists the recognition of a need for a better popular estimate of the importance of sound dental organs is by no means new. The expression of this is found in our literature in the shape of numerous articles bearing upon the education of the public in matters dental; also in the sporadic efforts here and there made toward carrying into effect plans for reaching the public ear, with a view to inculcating correct ideas as to the importance of the teeth to general bodily health; and again by supervision of the dental organs of public school children by competent dental operators.

On the whole, the results of such efforts as have been made in the directions indicated cannot be regarded as especially encouraging. The need certainly exists. The testimony of those who have had opportunity to examine the mouths of the classes attending our public schools is invariably and unanimously clear as to the general neglect of the dental organs and the ignorance both as to their care and the results which inevitably follow. The same testimony is given by those who supervise the infirmary service of dental schools.

Ignorance of dental hygiene is a condition natural to the rapid growth of dental art and science. What is known of dentistry has been achieved so quickly that its main features have not as yet had time to become common knowledge among the masses. The evil effects of neglect of the dental organs are not immediate, so that the relation of cause and effect between them is not so apparent. The results of dental diseases are wrought insidiously, consequently in the majority of cases the patient is wholly incapable of recognizing the causes leading to the difficulty from which he suffers. This fact, more than any other, has tended to obscure popular understanding of the origin of dental diseases, and to correspondingly minify the importance of dental hygienic measures, excepting as they may be in a minority of instances employed for cosmetic ends.

On the other hand, professional inquiry and study of dental and oral relations to matters of general health are progressively developing facts which demonstrate the intimate relations of the oral cavity and its contained organs to the whole economy. The fact is now well established that an imperfect or diseased dental apparatus is a potent cause of ill health, and conversely that a properly maintained oral hygiene is a safeguard against a large group of bodily infirmities too important to be ignored.

With recognized conditions before us of such grave importance, it would seem not less than a professional duty to take the steps that will ultimately translate these matters into terms of common knowledge available for the masses of people who most need it.

England and the continent are in advance of us in this matter. Already movements are in active operation abroad looking to the better care of the teeth of public school children. The occasional attempts made in America toward the same end have halted or failed for lack of organized effort in their execution, or, in some cases, because of professional criticism of the method pursued. What is needed is a man or group of men who are honest and intelligent in their endeavor, and individually large-minded enough to be able to ignore the petty criticisms which their efforts are bound to engender on the part of those who cannot see beyond the selfish motive as a reason for such a movement, and with enough enthusiasm for the object to carry it to a successful issue. Two fertile fields are open in relation to the public school system alone, —viz, by the direct inspection and care of the teeth of school children otherwise unprovided with dental care, and, second, by the introduction of an adequate amount of instruction in the schools on this important topic.

The need for hygienic care of school children is well and broadly recognized, and is already put into effective practical shape by the introduction of such measures as tend to surround the pupil with hygienic conditions, further by the inculcation of elementary data on the subject as a part of the educational scheme which the pupil has to pursue, to the end that he may know how to co-operate in the general effort to establish the conditions embodied in the axiom, "A sound mind in a healthy body." Much is ground into the pupil's brain relative to the need of exercise, fresh air, personal cleanliness, all of which is of much value; and lessons upon the evils of tobacco and alcohol upon the human system are given to him, which would be more valuable if prepared by physiologists, rather than sentimentalists, as is generally the case. Yet in all that he receives of so-called physiology and hygiene the importance of a hygienic care of the mouth and its contents, its important and vital relations to the whole body, are usually ignored or imperfectly presented.

It is idle to condemn the authors of school-books on hygiene for their failure in this regard; dental knowledge is special knowledge, and is lodged with its practitioners. If therefore it is to be disseminated and popularized, the work of spreading the dental gospel must be done by its votaries. It never can be well done otherwise.

No originality is claimed for this suggestion; it has frequently been offered and defended before, but it is repeated for the sake of emphasis, in the hope that a more serious effort may be made toward promoting the desired end with more definite results than heretofore. The introduction of correct teaching upon dental hygiene in school text-books should offer no difficulties that could not be quickly and easily overcome. Authors are usually glad to improve their works in any manner that will add to their value, and if the data pertaining to dental hygiene were offered for incorporation in our standard school text-books on hygiene it would undoubtedly find ready acceptance. If an organized effort in this direction were made through committees of state societies co-operating with the several state educational officers, the general introduction of the matter would be readily accomplished.

The public care and supervision of the teeth of school children by dental operators appointed for the purpose offers a more complicated problem, yet one not insurmountable if properly dealt with. As a practical step toward that end the creation of a sentiment in its favor should be the first care, and nothing could operate more effectually in creating a demand for such service than the dissemination of a knowledge of the need for it by the method already discussed of making dental hygiene a factor of public school instruction. That accomplished, the demand for a correction of the existing evils of unhygienic mouths will necessarily follow.

A concerted movement in this direction could readily be enforced by statistics already gathered, showing incontestably that much of the ill health and degenerate growth force of children is directly traceable to neglect of their mouths and teeth.

We would suggest that the several state societies take up this matter and sympathetically attempt its correction, for such a course will not only be productive of an incalculable amount of good to the general public, but will tend to refute in a large degree the often-heard criticism that dentistry thus far has rendered little or no public service for which it has not been well paid financially.

EDITORIAL CHANGES.

We learn with much pleasure of the advent of two distinguished members of the dental profession in the editorial ranks. Announcement is made that Dr. Wilbur F. Litch has assumed editorial control of the *Dental Brief*, and that Dr. J. Leon Williams will editorially conduct the *Weekly Dentist*, published in London. The professional and literary attainments of both of these gentlemen will insure a high standard of excellence for the publications over which they will preside, and the profession is to be congratulated that, pending the establishment of the Utopian professional dental journal, we are likely through the efforts of those at present in the field to have the advances, aims, and attainments of dentistry chronicled in presentable and readable form.

BIBLIOGRAPHICAL.

DEGENERACY: ITS CAUSES, SIGNS, AND RESULTS. By EUGENE S. TALBOT, M.D., D.D.S. Pp. 372. 120 Illustrations. London, Walter Scott, Ltd. Imported by Charles Scribner's Sons, New York. Price, cloth, $1.50.

This is Volume XXXVI of the Contemporary Science Series edited by Havelock Ellis, and is a most interesting book.

Some of Dr. Talbot's studies of degeneracy have long been familiar to dental readers, and we here have the results of his more extended studies of the same subject. The mass of data which he has collected is enormous; and while it is admirably condensed, nevertheless is an exhibit of vast labor carefully performed in this special field of anthropology.

From the point of view noted, nothing but praise can be given the author for this painstaking presentation of his labors. What most strikes the reader is the need for clearer exposition of just what degeneracy is. Perhaps in the existing state of knowledge a definition of degeneracy is not possible, if for no other reason than that a definition of normality is equally impossible. Yet some more comprehensive and positive expression of the author's own views upon the subject would have been welcome, especially as the lack of it tends to convey the impression that, recognizing no examples of normal types, he tends toward the view of regarding all as more or less degenerate.

Degeneracy is essentially a relative term, and as such should be carefully limited in its application. To regard every aberration from assumed normal conditions—*e.g.*, the vermiform appendix, dermoid cysts, corns, warts, goitre, etc.—as stigmata of degeneracy is, it would seem, a very sweeping use of the term, unless qualified by a recognition of its distinctly local applicability. Failure to clearly emphasize the limitations which necessarily condition the use of the term cannot fail, even though unjustly, to subject the author to the suspicion and criticism that the many-sided character of the truth which he sees may have blinded him to the conditions where it fails to apply. We are not yet ready to believe that whatever is, is degenerate, nor do we mean to imply that the author holds to that doctrine, but his book, valuable as it is, would have been more valuable as an exposition of the subject had it not lacked the constructive feature noted.

Dr. Brinton has well said, "There is no question in anthropology of more actual interest than that of degeneration, what it is, what it means, what are its signs. In one sense every step of progress involves degeneration, while in another sense degeneration is the antithesis of progress. There is no such thing as the normal type, the perfect man, and never was. What some writers assert as the acme of perfectibility, complete adaptation to environment, is, in fact, typical degeneration and a pathological condition."

SAJOUS'S ANNUAL AND ANALYTICAL CYCLOPÆDIA OF PRACTICAL MEDICINE. Edited by CHAS. E. DE M. SAJOUS, M.D., assisted by one hundred associate editors and a corps of corresponding editors, collaborators, and correspondents. The F. A. Davis Company, Philadelphia, New York, and Chicago, publishers.

Two volumes of this important publication have been issued. In its plan and scope it is unlike any other cyclopedic work in the same field. Its aim is to gather into condensed form the art and science of medicine for the uses of the busy practitioner. A work which does this well is to be highly commended. The immense amount of research necessary to an elucidation of the etiology and cure of disease makes it practically impossible for the busy practitioner, whose time is fully occupied in the applications of medical science to practice, to devote any considerable portion of his energies to independent investigation or often to extensive study. It is therefore necessary that the results of research upon which is based the scientific practice of medicine should be easily available to him. Dr. Sajous's work is a well-executed attempt to fill the need indicated. The cream of the current literature on medical topics is gathered under appropriate heads, and the latest methods of treatment are given in extenso.

The work is truly cyclopedic in character, intelligently edited, and as a work of reference valuable not only for the physician, but, in view of the increasingly close relationship of dentistry to medical practice, it should be of practical value to the progressive dentist.

OBITUARY.

DR. HENRY HOWARD KEITH.

HENRY HOWARD KEITH, D.D.S., the only son of Amos B. and Katie M. Keith, was born at Salem, Mass., June 14, 1847. He resided in Boston until the beginning of the civil war, when the family moved to Chicago. After working a short time in a machine shop to learn the use of tools he was apprenticed to his uncle, Mr. A., of New York, who was a jeweler. In 1864 Dr. Keith went to Philadelphia and entered the laboratory of Dr. Chas. J. Essig. He made such rapid progress that when Dr. Essig moved his laboratory to Baltimore in 1868 he took Dr. Keith with him, and while there he met the lady who afterward became his wife. After spending about two years in Baltimore he went to Newark, N. J., where he worked for Drs. DaCamare and Pinney until he was married, in January, 1871. His wife was Miss Nina L. Benteen, of Baltimore.

He came to St. Louis in February, 1871, and in the fall of the same year opened a laboratory. He was successively with Drs. Morrison, Eames, Park, McKellops, and Lange. He attended the Missouri Dental College and graduated while with Dr. Park, in 1873, and afterward held positions in the same college, in 1875-6 as demonstrator of mechanical dentistry, and was professor of mechanical dentistry from 1876 to 1879 inclusive.

Dr. Keith's talents lay in the direction of plate-work, in which he had no superior, though he had a large practice in operative work. His heart was in his profession, and he spared neither time nor pains when engaged in a difficult piece of work; and the greater the difficulties the more he enjoyed overcoming them—in which he seldom failed. As an operator he was equally skilled, and was extremely gentle and considerate of his patients.

His chief characteristic seemed to be a desire to help the younger members of the profession. Every one coming to St. Louis met with a pleasant welcome from him, and he always did what he could to advance them. His knowledge was given freely and heartily, and he was always eager to help or instruct others.

At Lake Minnetonka, in 1888, he contracted the liver trouble that finally caused his death. His summers, for seven years past, have been spent in Asheville, N. C., where he had a beautiful home. He also spent his Christmas and Easter vacations there, as the climate greatly benefited him. He returned to St. Louis in September, 1898, and, though in very poor health, he resumed his practice. His health failed very fast, and his death was the result of peritonitis. He died January 26, 1899, and was cremated at the St. Louis Crematory, as he had desired. His ashes are buried at Riverside Cemetery, at Asheville.

As an instructor he was one of the few man who seemed capable of imparting his knowledge so that the one instructed could not fail to grasp the ideas of the master mind. He was a member of a sketch club, and well versed in photography; for that reason he was an adept in illustrating his subject. His office was a study in itself for neatness, convenience, and all that was new in modern dentistry. His laboratory was equal to that of his office. He was considered one of the best continuous-gum workers in this country; all his work in this particular line had the finish of a master artist.

He was a man who was continually striving to accomplish something that would advance his profession. He was an active member of both state and city societies; of the latter he served four years as recording secretary, and in 1882 was the president, and no better drawing card could be announced than the mere statement that Dr. Keith would either read a paper or give a talk on some dental subject. As a professional man he was a model. He was never known to speak ill of any professional brother so as to advance himself in the estimation of his patients. His professional liberality was one of his many good traits that should be observed by us all. He was always willing to assist any dentist, both financially and professionally, and nothing would give him greater pleasure than to impart his practical knowledge to any brother needing his advice. He was a frequent contributor to the dental journals.

John G. Harper,
Walter M. Bartlett,
Jos. G. Pfaff,
Committee, St. Louis Dental Society.

DR. WM. CASE ADAMS.

Wm. Case Adams, D.D.S., L.D.S., was born at Lundy's Lane, October 18, 1823. His father, Rev. Ezra Adams, was a M. E. L. and a descendant of one of the oldest families in America. He received a liberal education at Victoria University, and came to Toronto in 1851 to study dentistry, and on graduation began practice in Toronto, being the third dentist in that place.

As a dentist he was one of the most progressive of his day. He was the first dentist in Canada to use nitrous oxid gas for anesthetic purposes. The first vulcanizer in Ontario for manufacture of rubber plates for artificial teeth was purchased by him for his office on King street, Toronto. He was also the inventor of a number of appliances now in ordinary dental use. He was a Methodist in religion, and one of the trustees of the old Adelaide Street Methodist Church, and later on a class leader in the Metropolitan Methodist Church, and at the time of his death a member of the Sherbourne Street Methodist Church. Since 1857 he was a Free Mason and member of St. Andrew's Lodge, A. F. and A. M., Toronto. In politics he was a reformer. He was also up to the time of his death a prominent worker in the temperance cause. A quarter of a century ago he had laid by as the result of a lucrative practice more of this world's goods than it is ordinarily the lot of a professional man in any city or in any country to acquire from his professional labors alone. Unwise investments, however, made it necessary for him to continue the practice of dentistry almost up to the time of his death. He was one of the fathers of dentistry in Canada, being one of the founders of the Royal College of Dental Surgeons of Ontario, and one of its first professors. Among the students of his office are some of the most eminent of the profession to-day, including Drs. J. B. Willmott, dean of the Dental College; Dr. J. G. Adams, Dr. R. G. Trotter, Dr. A. W. Spaulding, Dr. Geo. Adams Swaine, Dr. E. E. Culbert, and many others.

He was fond of horticulture as a pastime, and in the culture of grapes was more than ordinarily successful. Descended from one of the oldest and sturdiest of New England families, he was, like his predecessors for many generations, a disciple of muscular Christianity, and like them, though a worker and a thinker, he lived to a good old age. With a fine physique he inherited high moral qualities and honesty, integrity, and freedom from selfish ambition, and quiet, unostentatious charitable work was natural to him all his life. He leaves behind a wife and one daughter, the latter being well known to lovers of ceramic art.

PERISCOPE.

The Administration of Definite Mixtures of Nitrous Oxid and Air and of Nitrous Oxid and Oxygen.—A meeting of the Royal Medical and Chirurgical Society was held on February 14, Mr. F. J. Gant, vice-president, being in the chair.

Dr. F. W. Hewitt read a paper on the "Effects produced in the Human Subject by the Administration of Definite Mixtures of Nitrous Oxid and Air and of Nitrous Oxid and Oxygen." The investigation was based upon the following carefully recorded and timed administrations:

	Cases.
Pure nitrous oxid	22
Nitrous oxid mixed with different percentages of air	107
Nitrous oxid mixed with different percentages of oxygen	102
Total	231

In each administration records were made concerning anoxemic convulsion, cyanosis, or other changes of color, stertor, retching movements, phonation, excitement or reflex movements, after-effects, dreams, duration of inhalation, duration of anesthesia, quantity of gas or gases inhaled, operation performed, etc. In order to compare cases and groups of cases with one another and to ascertain to what extent certain symptoms were met with under certain mixtures, arbitrary numerical values were given to the phenomena of the different administrations. By this plan it was found possible to draw up charts and to make numerous interesting comparisons not only between groups of cases, but between administrations of different mixtures to the same patient on different occasions. The following were the conclusions at which Dr. Hewitt arrived: 1. When pure nitrous oxid was administered to the human subject in such a manner that no free oxygen gained admission during the administration, certain phenomena arose which might be regarded as being either (1) phenomena of anesthesia or (2) phenomena of asphyxia. 2. The anesthetic phenomena of nitrous oxid, although apparently very different from those of ether or chloroform, were in their essential features remarkably similar. 3. The most conspicuous of the asphyxial phenomena of pure nitrous oxid were (1) embarrassed and deeply stertorous breathing; (2) cyanosis; and (3) anoxemic convulsion. All these might be eliminated without interfering with the anesthetic effects of the gas by administering with it certain proportions of oxygen, either pure or as atmospheric air. 4. There were other less obvious asphyxial phenomena, such as wide dilatation of the pupils, swelling of the tongue and adjacent structures, and rapid cardiac action which, like the more important symptoms above referred to, might be prevented or modified by similar means. 5. Under the influence of pure nitrous oxid breathing became deeper and quicker than usual. At the end of from fifty-five to sixty-six seconds its rhythm became altered either by (1) obstructive stertor; (2) anoxemic convulsion attacking the respiratory muscles; or (3) both conditions combined. Paralytic cessation of breathing was very rare, and when it occurred was dependent quite as much upon cerebral anemia from defective circulation as upon the presence of unoxygenated blood in the vessels supplying the respiratory centers. 6. The deep and obstructive stertor of pure nitrous oxid narcosis was not met with when employing mixtures containing moderate percentages of air or oxygen. With such mixtures only soft snoring breathing was produced. When the percentage of air or oxygen was considerable (thirty per cent. of air or thirteen per cent. of oxygen) respiration became noiseless and free from all obstruction. 7. The most marked cyanosis was met with when very small percentages of air (from three to six per cent.) or oxygen (under three per cent.) were administered with nitrous oxid. With pure nitrous oxid cyanosis might not have time, as it were, to become pronounced, for the administration might be cut short by deep stertor. As the percentage of air or oxygen increased cyanosis lessened, till with thirty per cent. of air it was very slight, and with eleven per cent. of oxygen it disappeared altogether. 8. Anoxemic convulsion, like cyanosis, was liable to be greater with small percentages of air or oxygen than with pure nitrous oxid itself, and for the reason just given. But as the percentages of air or oxygen increased the convulsion decreased, till with thirty per cent. of air and six per cent. of oxygen respectively it ceased to occur. 9. Reflex and excitement movements were most likely to arise either with pure nitrous oxid or with nitrous oxid mixed with small percentages of air (from three to seven per cent.), or with nitrous oxid mixed with considerable percentages of air (from twenty to thirty per cent.), or oxygen (from ten to twenty per cent.). They were least likely to assert themselves with mixtures containing moderate quantities (from three to seven per cent.) of oxygen. 10. Phonated sounds were most common when nitrous oxid was administered with large percentages of air (from twelve to thirty per cent.) or oxygen (twenty per cent.). When nitrous oxid was administered pure or with small percentages of air (from three to five per cent.) they were met with to a moderate extent only. Phonation was least likely to arise with nitrous oxid and air mixtures when air was present to the extent of from six to ten per cent., and with nitrous oxid and oxygen mixtures when oxygen was present to the extent of from three to eleven per cent. 11. The duration of available anesthesia after inhalation was found to be longest after the administration of mixtures containing from three to eleven per cent. of oxygen, the maximum duration having been attained with seven per cent. mixtures. With nitrous oxid and air mixtures the resulting anesthesia was distinctly longer than with pure nitrous oxid, but the results were very uncertain in these cases. The shortest available anesthesia was recorded with nitrous oxid alone and with nitrous oxid mixtures containing thirty per cent. of air. 12. In estimating the respective merits of the various mixtures used as anesthetic agents the investigation showed that the best results were obtained with mixtures of nitrous oxid and oxygen, the next best with mixtures of nitrous oxid and air, and the worst with nitrous oxid free from air or oxygen. Air was not nearly so suitable as oxygen for eliminating the asphyxial factors of a pure nitrous oxid administration, owing to the large volume of useless nitrogen which must necessarily be inhaled. The nitrous oxid and air cases were, as compared with those of nitrous oxid and oxygen, far more uncertain in their course. 13. There was no one mixture of nitrous oxid with air or with oxygen which would successfully anesthetize every patient. 14. In order to obtain the best form of anesthesia oxygen should be administered with nitrous oxid by means of a regulating apparatus, the percentage of the former gas being progressively increased from two per cent. or three per cent. at the commencement of the administration to seven, eight, nine, or ten per cent., according to the circumstances of the case. The longer the administration lasted the greater might be the percentages of oxygen admitted. 15. The next best results to those obtainable by means of a regulating apparatus for nitrous oxid and oxygen were to be secured by administering certain constant mixtures of these two gases. Mixtures containing five, six, or seven per cent. of oxygen were the best for adult males, and mixtures containing seven, eight, or nine per cent. the best for females and children. 16. The next best results to those last mentioned were to be obtained by means of mixtures of nitrous oxid and air, from fourteen to eighteen per cent. of the latter being advisable in anesthetizing men and from eighteen to twenty-two per cent. in anesthetizing women and children. 17. Paul Bert, whose valuable researches upon the effects produced by the inhalation of nitrous oxid and oxygen were well known, regarded an increased atmospheric pressure as essential to the production of anesthesia by means of these gases. It was clear, however, from the foregoing investigation that deep and satisfactory anesthesia unaccompanied by any obvious asphyxial manifestations might be secured at ordinary pressures by mixtures of nitrous oxid and oxygen containing even as much of the latter gas as was present in our atmosphere. 18. The last-mentioned fact would seem at first sight to give a death-blow to the asphyxial theory of nitrous oxid anesthesia,—a theory which supposes that this gas produces its anesthesia by limiting or arresting normal oxidation processes within the central nervous system. But because no *obvious* asphyxial manifestations made their appearance during the inhalation it was not justifiable to assume that no such interference with oxidation was taking place.—*The Lancet.*

A CASE OF A TOOTH IMPACTED IN THE LEFT BRONCHUS; GANGRENE OF THE LEFT LUNG; DEATH.—A woman, aged twenty-six, was admitted to the Victoria Hospital, Burnley, on December 18, and died on December 30, 1897. She stated, on admission, that four days previously she was given gas for the purpose of having a tooth extracted. At the critical moment she appears to have taken a deep breath, the result being that the tooth, which must have escaped from the forceps, was inhaled into the air-passages. Thereafter extreme cyanosis occurred, and she had a feeling of tightness in the throat, with dyspnea, and a hard dry cough, aggravated by speaking or change of position. She had also a vague feeling of something being fixed inside the chest, but could not indicate the position. When I saw her she was lying on her back, with livid lips, and coughing in frequent paroxysms, but without expectoration. The coughing was much aggravated by attempts to speak, and by change of posture.

The left side of the chest scarcely moved at all on respiration. There were no breath-sounds audible over the left side of the chest, with the exception of tubular breathing at the left apex, accompanied by small moist *râles*, and this was indistinct posteriorly. On the outside of the left nipple there was a small area over which a friction rub was audible. On the left side, from the level of the nipple down to an inch from the umbilicus and backward as far as the mid-axillary line, there was a well-marked area of hyperesthesia, which corresponded roughly to the distribution of the sixth, seventh, and eighth dorsal spinal roots. The breath-sounds were harsh on the right side but otherwise normal. The pulse and respiration-rates were much quickened.

During the next few days there was little alteration in the patient's condition, but the temperature assumed the hectic type.

On December 27, thirteen days after the accident, there were well-marked signs of gangrene of the left lung. The breath was offensive, and there was expectoration of a brown and foul-smelling sputum. The lower cervical glands on the left side were enlarged, and there was a well-marked friction rub in the left axilla. Her condition became gradually worse until death occurred on December 30.

At the necropsy on December 31, 1897, I explored the trachea up to the larynx, but no foreign body was found there. All over the left pleural cavity there were numerous recent adhesions, and on separating these some grumous fluid came away from the lung. The heart was flabby and rather smaller than usual, and its right side was dilated. On cutting open the left bronchus the missing tooth was found. It was very tightly wedged in the bronchus, its point being downward and the crown upward, so that it had apparently acted as a "ball valve." It had almost ulcerated through the left bronchus, which above the situation of the tooth was congested and full of grumous fluid. On following the left bronchus into the lung there was found an irregular passage full of a brown foul-smelling fluid. The whole of the left lung was gangrenous and crepitating, and on squeezing the lung-substance there exuded a fluid of the character described. The bronchial glands were enlarged, and there was also an enlarged gland at the root of the neck on the left side. Above the impacted tooth no bronchiole was given off, so that there must have been entire obstruction. The right lung was congested and edematous, and showed commencing consolidation at the base. There were two cavities in the left lower jaw, and into the hinder one the tooth, which was carious, fitted exactly, its direction being forward and inward.

This case seems to illustrate the effects of obstruction to a bronchus, as Dr. Sevestre has recently pointed out in the *British Medical Journal*, the early stage being collapse of the lung, and the later, inflammation, leading sometimes to the entire disorganization and gangrene of the lung. The tooth did not appear to have been tightly wedged in at first when the patient was seen, but seemed to have become so owing to the incessant attempts to expel the foreign body, and with each attempt the conditions must have been aggravated by the suction in during inspiration. The gangrene would be excited both by the retention of secretion, and by the introduction of septic material from the tooth.—*James S. Warrack, M.A., M.D., in British Medical Journal.*

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HINTS, QUERIES, AND COMMENTS.

To the Editor of the Dental Cosmos:

Sir,—I conceived an idea the other day in my laboratory work, and which others may find useful. It is as follows:

In preparing a full upper or under denture for investment in the vulcanizing flask, and when the set is finally waxed up, take a piece of waxed floss silk and, commencing at the condyle, lay it closely on where the wax terminates at the top, or, if an under set, at the bottom of the rim. Carry the waxed thread entirely around the rim and bring the other end of the thread back over the other condyle.

The set can then be invested on the under side of the flask, and the plaster allowed to flow up so as to cover the silk, which is now around the set at the line where the division is to be made between the two parts of the mold.

When the plaster has stiffened just a trifle, place the thumb of the left hand in the center of the set and the fingers on the bottom of the flask and invert it. Then, taking the silk by one of the ends, and drawing it firmly but gently taut, pull it away from the set, keeping the silk touching the edge of the flask.

The silk can be drawn in this manner all around the set so as to cut off all surplus plaster very evenly, and so that the excess will drop into the waste-box.

This accomplishes the same work as the knife, and does it much better, doing away with the danger of marring the wax with the knife and also bringing the plaster more accurately to the top of the set.

The wax around the side of the set can be chalked, which will facilitate the detachment and dropping off of the surplus plaster. R. Brittain.

Boston, Mass.

An Incident of Office Practice.—Recently I had occasion to fill the root of an upper lateral incisor. After drying out the canal with hot air by means of the chip-blower in the usual manner, the patient complained of severe pain in the region of the eye. I did not attach to it much importance, but went on with the operation, after which he again called my attention to it. We also noticed a decided swelling of the cheek and lower eyelid, which proved quite alarming to the patient.

The inference is that I had the point of the chip-blower fastened in the pulp-chamber so tightly that it would not allow the air to escape; on the contrary, it passed through the foramen and found its way into the soft tissues. The swelling went down considerably next day, and shortly afterward disappeared altogether.

The lesson to be drawn from the above is to rest the hot-air syringe lightly in the pulp-chamber so as not to preclude the air from returning.—RUDOLPH ERLER, D.D.S.

ALUMINUM CROWNS.—I make aluminum crowns in one solid piece, with a Morrison outfit. They do not corrode; give entire satisfaction, and for cheap, quick work are unexcelled.—P. A. SKEEN, Dentist, Texarkana, Ark., February 2, 1899.

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A MONTHLY BIBLIOGRAPHY OF DENTAL LITERATURE.

COMPILED BY J. MELVIN LAMB, M.D., D.D.S., WASHINGTON, D. C.

The abbreviations of titles used are those common to bibliographical work, and will, it is presumed, be readily comprehended by any one familiar with dental or scientific publications. Any explanation will be gladly furnished by the compiler. A star (*) indicates a thesis.

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LIST OF UNITED STATES PATENTS

PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING FEBRUARY, 1899.

February 7.—No. 619,188, to Israel S. Kirkwood. Cotton-box for dentists.
" " No. 619,217, to Oscar H. Pieper and Alphonse F. Pieper. Electric motor.
" " No. 619,226, to Frank Ritter. Dental chair.
" *14.*—No. 619.272, to Arthur W. Browne. Head-rest.
" " No 619.586, to Theodore G. Lewis. Dental articulator.
" " No. 619.596, to Jacob F. Mayer. Adjustable stool.
" *21.*—No. 619,832, to Hugh McLaren. Automatic dental plugger.
" " No. 619,847, to John H. Slinkman. Apparatus for casting crowns.
" " No. 619,928, to Chauncey L. Bigelow. Dental cabinet.
" *28.*—No. 620,303, to Ferdinand Groshaus. Dental flask.
" " No. 620,222, to Arthur W. Browne and Geo. L. Harrison. Cotton-holder and waste-receptacle.

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ORIGINAL COMMUNICATIONS.

WHAT ARE THE BEST MATERIALS FOR FILLING CHILDREN'S TEETH.*

JAMES TRUMAN, D.D.S., PHILADELPHIA, PA.

THE request sent to me to give my views in regard to the best materials for filling children's anterior teeth opens up a subject that should cover more thought than can be given it in a "five-minute essay"—the limit demanded.

The question naturally resolves itself into the query, Why should not children's teeth be filled with the same materials as those of mature years? Consideration will be given to this prior to the main query in regard to the suitable filling-material.

It must be recognized by all practitioners that the histological character of the tissues of the teeth varies with age, and while Dr. Black's dictum, that "there is no basis for the supposition that the teeth of children under the age of twelve years are too soft to receive metallic fillings," remains as he placed it, it is certainly a clinical as well as a histological fact that the tissues composing the teeth are in an undeveloped condition for a series of years subsequent to their eruption. The normal development of dentin has not been completed when the entire exterior formation of the tooth is fully formed. The pulp occupies a larger proportion of the interior body then than at a later period. The so-called tubes have a much larger diameter, and consequently contain a greater quantity of organic matter. This period of imperfect development has not as yet been defined by correct observation, but it remains a fact. The enamel, having its origin in the ameloblasts at the peripheral border of the dentin, may be regarded as an almost finished tissue when fully formed, differing in this respect from dentin.

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*A symposium of contributions on the subject presented at the union meeting of the Maryland State Dental Association, Washington City Dental Society, and Virginia State Dental Association, held at Baltimore, Md., June 2-4, 1898.

Accepting these statements, what are the conclusions in connection with them? First, that the protoplasmic endings of the odontoblastic layer will present a larger surface subject to irritation, and the pulp, filling a greater space in the body of the tooth, will not only be more readily accessible in the crown, but any irritant applied upon the open ends of the tubes will be more quickly transferred to the central organ, with the resultant effect of congestion, inflammation, and final devitalization. It is an accepted fact in the histology of tooth-tissues that a *slight* irritation, as in constant attrition of opposing teeth, will be felt through the entire body of dentin and excite the odontoblastic cells to renewed vitality, with the formation of secondary dentin as a result. If this irritation be in excess destruction follows; not only of the contents of the tubuli, but eventually of the pulp. Hence this action resolves itself into this axiomatic formula, slight irritation produces redevelopment, excessive irritation results in destruction.

This law holds good during all changes in the life of the organ, but it is especially to be regarded during this undeveloped period.

If, then, these histological facts be considered of value in determining procedures in operative dentistry, there must be given a corresponding value to their force from a pathological standpoint.

The dentist is called upon to treat teeth at all ages. He has certain factors to contend with during his entire period of practice. These are age and character of tissue. He must, to insure success, give due consideration to both. At all points he is liable to meet a hyperesthetic condition of the contents of the tubuli, but this, for reasons stated, is more pronounced from twelve to twenty, and will need more careful attention. All irritants act during this period injuriously upon dentin, and in proportion to the extent to which they are carried will results be antagonistic to the life of the teeth.

It is therefore imperative, as the essayist views it, to avoid all materials that will produce this result. Hence all of those which act as good conductors of thermal influences must be excluded, such as gold, amalgam, or even the phosphate cements. This narrows down the list.

Thermal action, if slight, may be productive of good in creating an increased vital action, producing an increased nutrition in dentin, greater density, and consequently more power of resistance; but this, unfortunately, is very exceptional. The general result is that the irritation upon hyperesthetic tissue is persistent, and invariably ends in pathological conditions.

What, then, are the materials best adapted for filling anterior teeth? We are limited to two, tin and gutta-percha. The former is a poor conductor, and, if properly packed, makes a reliable filling, but it must be given the best conditions. Tin, while not very cohesive, has a sufficiency of that property for compact filling. Its cohesiveness may be slightly increased by heating nearly to the melting point. This property of cohesiveness in tin should never be lost sight of in filling teeth, for it is relatively of as much value as the same quality in gold. The tin used should range from Nos. 6 to 10, cut in strips of proper width, and not folded. With serrated instruments it can be packed solidly in cavities, and, where the rubber-dam or napkins are not available, it can readily be packed in cavities wet. This is a desideratum in young children. The color is objectionable, but this is not important, as the aim of the operator must be to save teeth until age produces an increased density. For most cases gutta-percha is preferable, and, while it will require frequent renewals, it serves an admirable purpose up to the time previously mentioned.

Oxyphosphate is objectionable, for it is feared that it has a deleterious effect upon the sensitive tissues of young teeth. While this as yet needs confirmation through careful observation and compiled statistics, it should be regarded as among the doubtful materials for young people, unless the dentin be protected before its insertion by a varnish or chloro-percha. If gold be considered essential in exceptional cases, then the dentin should be also protected in the same way. A layer or cavity-lining of tin is a valuable aid in preventing thermal action.

It will be seen therefore that the essayist is opposed to all metal fillings prior to maturity, unless the dentin be protected; and he would regard non-attention to the clearly established facts of irritation, inflammation, and destructive pathological sequelæ as deserving severe criticism. The teeth of children should not be treated as though completely formed, nor should teeth at any age be worked upon as though separated from the vital forces that govern the entire organism.

SIDNEY S. STOWELL, D.D.S., PITTSFIELD, MASS.

If, in referring to children's anterior teeth, the deciduous set are considered, oxyphosphate of zinc is pre-eminently the best material. Why? Because of its adhesive property it can be inserted with a minimum amount of excavating, thereby favoring the little ones all that is possible during their tenderest years.

Referring to the permanent teeth, *conditions* must modify and govern the choice of materials. If the cavity be deep, so as to in any way endanger the life of the pulp, excavate conservatively, removing all the non-sensitive tissue with the assurance that, if properly aided, nature will recalcify all softened dentin when sensitive living fiber remains; as these fibers were the original tooth-forming organs, so they are still able to rebuild the broken-down dentin under favorable conditions, which conditions are as follows:

Carefully excavate all non-sensitive or literally *dead* tissue, and bathe the cavity with five per cent. alcoholic solution of hydronaphthol. The alcohol penetrates all soft, moist tissue, carrying with it this wonderful healing antiseptic, hydronaphthol, which is left in the tissues as the alcohol is driven off by evaporation. Dry the cavity and fill with Stowell's hydronaphthol cement, and the sensitive dentin will be recalcified and the most threatened pulp will be saved alive, the value of which in a young subject cannot be too highly estimated.

This method of treatment is equally applicable in all soft hypersensitive teeth where the pulp is nearly or partially exposed, in all mature subjects as well as in the young. In many cases the cavity may be only lined with a hydronaphthol cement thinly mixed, and completed with a good hard cement.

There is a great difference in oxyphosphates, and results vary as to quality and how they are mixed. One maker advises least possible trituration in mixing, and another the greatest amount, kneading well before inserting. Of the latter, I have found the "Harvard" most satisfactory.

In such children's teeth as are reasonably well developed between the ages of six and eighteen years, good gutta-percha may be used to excellent advantage by a gutta-percha expert. "None others need apply" or hope for success unless they are well skilled in the selection and use of the material. A good gutta-percha filling in a good tooth will last through childhood's years to maturity, when, and only then, should gold be used. The deplorable number of gold fillings with dark margins in lateral incisors having devitalized pulps should be sufficient warning to urge conservatism in the treatment of this class of teeth.

LOUIS C. LE ROY, D.D.S., NEW YORK, N. Y.

A dissertation should be entered into upon the subject of "filling children's anterior teeth," and then not all would have been said about the importance of conserving them.

For my part, the molars, which are the first (generally) to evidence deterioration, should be dwelt on more particularly.

In a consideration of the anterior teeth in children's mouths I presume the purpose of your committee is to call forth the esthetic properties of this part of dental practice.

It would seem that the simple and, as a rule, the quite small approximal cavities need not be dwelt with long. The caries which we see at that stage is mostly of the brown, leathery character; can be easily and, with care, practically painlessly removed and expeditiously reconstructed with a high heat gutta-percha after having chloro-perchaed the base of the cavity, which conserves a double purpose. It cements the filling to the tooth-walls, and insures perfect adaptation of the material used for filling; also reduces the sensibility of the patient to the temperature of high heat gutta-percha. This material will stand a few years' service and appear presentable until the teeth are lost by edentation.

Occasionally we find carious spots which are hypersensitive. These I treat with strong solution of silver nitrate, fifty per cent. or by deliquescing silver nitrate crystal in each cavity of decay absorbing all excess solution that can be removed after a half-minute or so. Of course, the part operated upon is kept as free from moisture as possible.

This ($AgNO_3$) practice will always arrest caries, and is at times the most politic performance, especially in those cases in which the enamel is almost entirely lacking.

In a short while exposure to oxidizing influences causes the silver nitrate to discolor *black*, which is tolerated even by the very fastidious parent when it is explained that the method in all other respects gives such satisfactory results, positively conserving the teeth until they shall be replaced by others more permanent. But occasionally objections are raised because of the disfigurement.

Several times during the past few years I have overcome the blackness by a practice almost as unsightly, but it pleased the parents; and, it being only a temporary fixture, my conscience was eased.

In two of the cases gold shells were constructed of very thin plate, about No. 36 or thinner gauge. In the latter cases platinum was substituted, which proved much less conspicuous.

The ease and rapidity, with freedom from discomfort to the patient, with which thin metal can be adjusted, shaped, and attached to these anterior teeth will surprise those who try this plan of catering to the esthetic tastes of indulgent parents.

E. K. WEDELSTAEDT, D.D.S., ST. PAUL, MINN.

Some time ago the chairman of the Joint Executive Committee wrote and asked if I would prepare a five-minute essay on the above subject. I replied it would give me pleasure to do so, and at once set about arranging for the same. First, I took it for granted that permanent teeth were referred to. The first child that came after I received Dr. Mills's letter was a boy eight years old. The central incisors were all in place, so I thought I would ascertain with how much force he could bite. The gnatho-dynamometer registered forty pounds on completion of the test. The next twelve or fifteen children that I saw were asked to bite on the gnatho-dynamometer, with the result that I have records ranging from fifteen to fifty pounds. Nearly all the children were about twelve years of age; some were boys, some girls. The reason for calling your attention to the stress is this: It is something entirely new; it gives us some idea only of the amount of force with which children can bite. This does not necessarily mean that the table is the limit of pounds' pressure that children can bite—not that; it merely shows what they do bite on the instrument for a practical test. This knowledge is of value, as it gives us some idea how strong anchorages should be made for the restoration of an angle or the insertion of an artificial crown where either has been accidentally lost. I felt that it would be of interest for you to know this.

A considerable number of measurements were made of the width of the exposed enamel at the gingivæ (mesio-distally). This is also of value to us, but the time limit does not permit my going into detail as regards it.

Next the record was looked up, and it was discovered that the majority of children for whom cavities in the anterior teeth were filled were between the ages of ten and fourteen. It was also discovered that gold was the filling-material principally used for all cavities on the mesial, distal, labial, and lingual surfaces. 'Tis true, other filling-materials have been used; ot this I will speak later. Let us state the question again, "With what do I fill the anterior teeth of children? Why?"

That depends on, first, the disposition of the child; second, age of child; third, health of child; fourth, sex of child; fifth, where the cavity is situated; sixth, size of cavity; seventh, the character of the decay.

These seven things should receive careful consideration, and our method of procedure be based on them. Each case brought to us should be carefully studied, and the seven considerations above mentioned applied to the case in hand. For example, a mother brings her two children, a boy and a girl. The lad is ten years of age. He is short in stature and physically strong. One glance tells us that he lives in the open air as much as possible. He has a typical boy's look; his eyes are bright, his cheeks rosy, his bones firmly knit; he has, in a word, every indication that he is in good health and enjoys good food as a consequence, and, as a rule, plenty of good sport. His sister, twelve years of age, is just the reverse. Examination of their teeth reveals mesial cavities in the middle third of the upper central incisors. All four cavities are about the same size, 1.9 millimeters gingivo-incisally, 1.5 millimeters linguo-labially by 1.2 millimeters deep mesio-pulpally (before cavities were prepared).

Let us commence with the boy. After separation had been obtained, I should carefully study the outline form, the resistance form, the retentive form, the convenience form, and the marginal form, and apply them to the cavities before and during the preparation; and I should make gold fillings that I would expect to be permanent ones.

For the girl of twelve, who was not in the same physical condition as her brother, I would not be so particular in my application of these five different forms to her cavities. Her teeth would also be filled with gold, but I should expect her to return in five years with linguo-gingival decay around the margins of her fillings.

You desire to know why I made this distinction and difference? Why permanent work has been done for one and temporary for the other? The reason is this: I base my judgment on the seven considerations that should govern the filling of teeth for children, and I do not think I am wrong. Gold is used because better work is done with it, and better results are obtained in the majority of cases. In some cases cement is used, in others gutta-percha, but these are the exceptions. I am governed in the use of these two latter (very valuable filling-materials in their respective places) by the seven considerations already mentioned.

I question the advisability of asking a physician how he would treat typhoid fever in children. Each case should be considered by itself, for it is impossible to have a definite rule to govern all. The self-same question is applicable here. We cannot have definite rules covering a period of seven years (the time between the appearance of the permanent incisors and the age of puberty) that will govern the filling of the anterior teeth. There are certain rules that can be applied at one time for some children that will not answer for others, although the others may be about the same age. We can do many things for a child of twelve or thirteen that we would not dare to do for one of eight or nine, for the reason that the development of the teeth has not progressed to that degree in the last named age that it has in the first.

The topic given me to write upon is worthy of a very long essay, but your chairman has asked for a five-minute paper, so the time is up. It is a pleasure to acknowledge my indebtedness to Dr. G. V. Black for the five forms governing cavity preparation, as he has not as yet published them.

WILLIAM G. CLARK, D.D.S., CEDAR RAPIDS, IA.

Our first duty is to gain the confidence of the child. This, owing to the delicate nervous organization of most children, can best be accomplished by avoiding prolonged and painful operations. The life of the pulp in the deciduous teeth should be preserved if possible. However, if the pulp is dead it is best that the tooth be retained to preserve the contour of the jaw until the eruption of the permanent tooth.

Decay can be arrested in anterior deciduous teeth where the cavity is shallow and will not permit excavating, by removing as much softened dentin as can be done without causing pain. Cauterize the surface of the dentin with silver nitrate. Where cavities are of such form as can be filled, remove softened dentin, cauterize the surface, protecting the deposit by covering with gutta-percha or zinc phosphate.

Adopt every possible means to preserve the life of the pulp in the permanent anterior teeth. It is allowable to take chances at this time that would be unwise later in life. One method of protection when the pulp is exposed, or nearly so, is as follows: Isolate the tooth with rubber cloth; remove *débris* and as much of the softened dentin as possible; flood the cavity with a non-irritating antiseptic and allow it to remain a short time; remove with absorbent cotton, cover the surface with gutta-percha dissolved in eucalyptus; then a layer of oxychlorid of zinc, covering all and filling the cavity with zinc phosphate or gutta-percha.

Where the life of the pulp is not in danger the cavity should be carefully excavated, the surface of the dentin covered with copal-ether varnish, then fill with zinc phosphate or gutta-percha. These fillings should be renewed from time to time, as will be found necessary, until the conditions are favorable for a gold filling.

We sometimes find conditions where it is advisable to fill with gold. These depend upon the general health, the character of the secretions in the mouth, and, to a great degree, upon the dental education of both mother and child. In a large majority of cases I consider it inadvisable to fill with gold before the child is fourteen years of age.

When the pulp is dead the procedure is the same as for older people, except that greater care is necessary in closing the foramen to avoid forcing filling-material through the opening, which is so much larger at that period. It may also be well to remember that there is a greater proportion of disorganized animal matter in the dentin than when the tooth is fully developed. Systematic examinations should be made at stated periods.

GEORGE V. I. BROWN, D.D.S., M.D., C.M., MILWAUKEE, WIS.

A three-minute limit in discussing a subject so broad necessitates a condensation of one's ideas which scarcely leaves room for sufficient elaboration; therefore I find it necessary to begin with a few distinct propositions. Firstly, the filling which in my practice is of the most general usefulness, up to an age when the term children could not properly be applied, is cement; most often the phosphate of zinc cement, occasionally oxychlorid of zinc. Secondly, I would add, as last in importance for the children, but first in importance for adults, the king of filling-materials, gold.

The experiments of Dr. Black have taken from under us—at least from those who believed in it—the theory that by filling with cement for a few years there would be a hardening of the dentin by an increase of the lime-salts, which would insure the greater durability of the gold filling when finally inserted, because the experiments referred to have shown that the difference between the hardest teeth and what we recognize as the softest teeth, so far as lime-salts are concerned, is very slight; that such slight differences existed quite as frequently in favor of mouths with caries rampant as in mouths where little or none was present. Nevertheless it seems to me quite unnecessary that we should throw away the valuable product of many years' clinical experience simply because laboratory experiments have demonstrated that the reasons we ascribed for our methods of practice were not what we thought them to be; for the fact still remains that teeth so cared for do, in the long run, after the final insertion of gold fillings, undoubtedly give better results than those in which the fillings were inserted earlier and in the face of disadvantageous conditions. There are two principal reasons why, without gainsaying the experiments referred to, or the deductions therefrom, in the slightest degree, better results can be obtained by the use of cement as a preparatory filling during earlier years. The first of these is not, as was supposed, because of increased lime-salts and hardening of the dentin, but for the reason that certain general conditions perhaps but little understood favor the growth of mouth bacteria and fermentative conditions with which they are associated, which have a destructive influence upon tooth-structure and tend to an increase of dental caries; that when in such mouths all existing cavities have been stopped temporarily and proper prophylactic measures taken with a view to eliminate these destructive conditions, the tendency to dental caries markedly decreases; therefore a permanent filling inserted under favorable conditions naturally gives greater promise of future usefulness than one inserted amid unfavorable surroundings. The second reason is that, having renewed the fillings from time to time until all of the teeth have been erupted and finally adjusted themselves in the arch, their relative conditions having become finally settled, the festoon of gum between the teeth, so common in young people, having withdrawn in the course of natural development, that portion of the tooth-surface with which we are concerned in the cavity that we expect to fill is in its own proper relation not only to the gum, but the adjoining tooth-surfaces as well; and, having filled such cavities with proper care for interdental spaces and the cervical borders of our fillings, they will in all probability remain relatively the same for a considerable number of years, whereas had this been done in the mouths of very young persons these conditions, in spite of all we might have been able to do, would be inevitably altered and the future usefulness of our work endangered.

There is one reason particularly applicable to juvenile patients, not perhaps of scientific importance, but clinically of the highest value and consideration,—viz, the fact that cement fillings can be inserted without the necessity of submitting the patient to any considerable pain; for if an operation be performed upon a child, no matter how well, if very painful it is quite probable he will avoid in every possible manner future visits to the dentist, and thus neglect of the teeth be assured. On the other hand, if it be painless or accompanied with but slight discomfort it is possible to retain the confidence of that child in such a manner that continued care can easily become an assured fact, and at some later period a more permanent and desirable filling be inserted. The great point in dealing with all children is to instill from the beginning the idea that systematic care during the years of childhood will ultimately enable you to put the mouth in such a condition that, by the continuance of certain prophylactic measures, comparatively little will be necessary in the way of future operations.

In conclusion,—simulating an Irish bull,—I desire to state that the best filling for children's teeth is the natural enamel; and, though it may seem to be in no way germane to the subject in hand, would call attention to the fact that it is of much greater importance for us to prevent the formation of these cavities or abort them before they are sufficiently under way to necessitate any filling-material than it is to fill in the most skillful manner possible or with the best known materials afterward. This can only be done, in my opinion, by eternal vigilance, the price of everything in dentistry of the young. Not only should these little people be taught and drilled in the prophylactic measures which we all recognize as necessary, but at certain intervals, not too far apart, they should come to see us; and wherever we find the surfaces of teeth by contact forming an inviting place for lodgment of destructive bacteria we should separate and polish those surfaces, with a view to correction of the point of contact in such a manner that future destructive action will be most unlikely. I was interested last spring, in visiting the office of Dr. W. G. A. Bonwill, of Philadelphia, Pa., to see the mouths of a number of patients that had been treated in their earlier years by the cutting of V-shaped spaces upon mesial and distal surfaces of all the upper incisors, sloping away the lingual surfaces to preclude the possibility of the lodgment of particles of food or other *débris* between them, and the formation of carious cavities.

In my own practice, without going to such extremes, it has been my custom for years, by the use of strips and disks, to make, so far as possible, ideal points of contact. Many times, upon separating teeth that seemed to be perfectly sound, I have found, as we all have, little places where decalcification had begun, and after smoothing or polishing these surfaces, correcting the form in proper manner, there has been no tendency toward recurrence of the trouble for many years after. This I believe to be the essential and all-important thing to be done in the care of children's teeth wherever possible.

Undoubtedly soft gold has a place which in skillful hands could not be supplied by anything else. As a general proposition, however, I would reiterate, in closing, that I believe, until such time as the anatomical relations have undergone the changes that commonly take place between childhood and the years immediately following puberty, that cement and, on unexposed surfaces, gutta-percha fillings are, other things being equal, of greater usefulness than gold or any of the other materials which we look upon as permanent, desirable, and the best in later life.

ALTON H. THOMPSON, D.D.S., TOPEKA, KANSAS.

The selection of materials for the filling of children's teeth—both of the deciduous series and the newly-erupted permanent teeth which have been attacked by caries—is a very important matter from the therapeutic standpoint. The choice of materials for fillings at this age has quite as much bearing upon the success of the preservative operations as operative procedure. It too often happens, however, that little discrimination is exercised, and that all of the teeth during childhood and adolescence are filled by the same methods and with the same materials that would be employed for the permanent teeth during adult life. A mere routine system is pursued, without the least attempt at discrimination. The error of this routine practice has been abundantly demonstrated by the general failure of fillings thus inserted during childhood. Hence the question is a very pertinent one, What are the best materials for filling children's teeth, and why? Should the teeth of children be treated the same as the teeth of adult years? And, if not, why not?

Our contention is that they should *not* be thus treated, except perhaps in the very few cases where they are of exceptionally good structure. In the first place, we well know that the deciduous teeth, to begin with them, are possessed of a much less proportion of earthy matter, and are consequently less dense in structure, than the permanent teeth of adult years. Organic matter is present in a larger proportion, and the deciduous dental tissues are therefore more porous and osmotic and permeable by fluids; they are more sensitive to shock, and possess less vitality and recuperative power; the pulp is larger in proportion to the crown, the horns projecting far toward the periphery, and, like all the tissues in childhood, is more fluid and less dense than in adult life, and succumbs more readily to injurious influences. For these reasons, in addition to the difficulty of performing careful operations for children, gold is contraindicated for use in children's teeth, and the softer materials should be employed. For the temporary molars, the first in importance and value is amalgam. The cavity should be prepared by as thorough cleansing as possible about the margins, but leaving some carious tissue in the direction of the pulp for its protection, and after saturation with an antiseptic, the cavity should be lined with cement to the enamel edge. Sometimes the amalgam can best be added while the cement is soft, thereby making a better union of the two materials. When placed in direct contact with the dental tissues the oxidation of the amalgam has, of course, a permanent effect upon them, and destroys the septic conditions attending dental caries.

Gutta-percha, although often employed, is not indicated in the filling of deciduous molars, for the reasons that it does not exclude moisture, it does not neutralize the septic conditions attending dental caries, does not resist the force of mastication, and in approximal cavities crushes down into the interdental space to cause absorption of the septum and, by spreading the teeth, deranges their symmetrical arrangement. It may answer a purpose in buccal cavities or in the approximal cavities of the deciduous incisors, but the real merits of gutta-percha as a filling-material are but very few.

The durable cements hold a good place as materials for filling deciduous teeth, except the one fault as to the uncertainty of their durability. As is well known, the durability of cement fillings—of any given cement—varies with the variation of the solvent properties of the fluids of different mouths. This is especially true in regard to children. In some it lasts very well, and in others not at all. As a rule, however, its average durability is such as to make it a good filling-material to use in children's teeth, and render it useful that far. Cement is the best preserver of tooth-substance so long as it escapes the wear of mastication and the solvent power of the oral fluids. The soft tissues of the deciduous teeth are best preserved by cement, as it closes the tubuli and prevents exudation of fluids about the filling which would by decomposition lead to caries about other materials. Therefore the combination of cement and amalgam is most excellent for the deciduous molars. The anterior deciduous teeth are best filled with cement, as in approximal cavities it is not exposed to wear. Sometimes the white, hard preparations of gutta-percha can be employed in these cavities, as it resists the solvent powers of the oral fluids.

It is good practice to place short gold caps—mere caps—over broken-down deciduous molars, or even incisors. They can be made to serve a good purpose for mastication for the few years these teeth remain.

In regard to the filling of the permanent teeth during childhood and adolescence much might be said, but we wish, right at the start, to protest against the indiscriminate routine treatment of these teeth, as would be done with them during adult years. As with the deciduous teeth (which the permanent teeth during childhood much resemble in quality and structure), results have abundantly demonstrated the fallacy of this method. Gold fillings inserted at this age nearly always fail, and naturally so. As is well known, all the tissues during childhood, owing to the rapid evolution of the organism, are less dense and compact, to speak vulgarly, than the same tissues are in the adult period. This is especially true of the osseous organization, and the teeth belong to that category. The teeth are less dense at the time of their eruption than at maturity, and more susceptible to caries. Therefore the first molars and incisors succumb first in dentures of defective organization, and, being very soft, porous, and partially uncalcified, it follows that they should be treated much the same as the deciduous teeth. Gold is contraindicated in these teeth, and naturally usually fails when so employed. The softer materials are indicated and have a much better therapeutic effect, and for much the same reasons as in the deciduous teeth. In rare instances, of course, the teeth of some children are so dense as to bear gold very well, but, in the classic words of Dr. J. Foster Flagg, "in proportion as these teeth need saving, gold is the worst material to use."

Therefore we recommend amalgam, or the combination of cement and amalgam, for buccal teeth, and cement for the labial teeth of the permanent denture during adolescence. For the anterior teeth good, durable cement is the best at this age, to be renewed as may be necessary until adult age or nearly so, say sixteen to eighteen, when gold can be safely inserted. The cement is thus employed during the growing years, until the dental tissues have attained their normal density, merely as an expedient until the dense texture of maturity shall have been attained. The wisdom of this method of procedure has been abundantly demonstrated by the results of twenty years of practice of the method. These deductions are from clinical observations from empirical practice, but the results accomplished fully justify the claims made for the method and the confidence with which it is recommended.

THEODORE F. CHUPEIN, D.D.S., PHILADELPHIA, PA.

The filling of children's teeth, at the best, may be regarded more "a labor of love" than one of "profit" or "selection." The operator is so trammeled by these irresponsible patients that it is a greater pleasure to tell them "good-by" than to induce them to take the chair.

The filling of the anterior teeth, however, is attended with less strain to either party than the posterior ones. For filling these teeth, where anything like excavation can be done, we regard gutta-percha as a *sine qua non*. Even where the cavities are saucer-shaped, by wiping these out with the merest film of eucalyptus oil, and taking a piece of gutta-percha just the size of the cavity, the solvent action of the oil will cause it to adhere. It is not well to get more of the gutta-percha than is just sufficient to fill the cavity, so that the warmed burnisher will make it flush with the borders of the cavity. We think the pink base-plate gutta-percha as good as any for these purposes.

Should there be two approximal cavities in any of these front teeth, as will be most likely, we do not hesitate to bridge from one cavity to the other, making one filling. By these means there is better retention for the material, and the preservative effects of the gutta-percha will be exerted for both teeth.

No child of three to five years of age will permit the application of the rubber-dam. Indeed, even did they permit it, we regard its application as useless for the front teeth. Even a napkin makes them restive, so that we have found the best means to secure comparative dryness is to fold a piece of Japanese bibulous paper several times, about as wide as the little finger and about one and a half inches long, and laying this on the gum and letting the lips lie over it will secure the dryness required. A few pieces of this paper should be rolled into pellets the size of the cavity, so as to be ready at hand to absorb the moisture from the cavity or cavities; for whatever is to be done for these "little men or women" must be done in the shortest space of time. When any delay is anticipated from the nature of the case, the telling of a story, the explanation of the operation, or the presentation of an inexpensive toy will often enchain their attention so as to enable you to complete your work in a comparatively satisfactory manner. The doing of first-class work for "tots" of these ages is out of the question, and if we can bridge over the space between the loss of the first teeth and the eruption of the second, and save them from the tortures of toothache and their parents from sleepless nights, we will have done our whole duty.

We have used the silver nitrate with the utmost satisfaction, employing no filling-material whatever. Our little granddaughter had a large decayed place on the entire labial surface of the right upper cuspid. To shape a shallow cavity in such a situation for a child of four years of age is a thing more favorably regarded "in the abstract" than "in the reality," so we simply applied, with a small cotton swab on the end of a probe, a saturated solution of silver nitrate to the decayed dentin. We made no attempt to remove the decay. The drug has neutralized the decay, and, although the spot remains "black," no further decay nor extension of it has supervened, although done over a year ago.

It is a favorite plan of ours in treating the back teeth to make use of this solution of silver nitrate, covering it and bridging two approximal cavities with pink gutta-percha.

Where there is excessive decay in the approximal surfaces of the front teeth, involving the tooth from its cervical margin to its cutting-edge, we do not hesitate to cut these teeth like the teeth of a saw. This may be done with a fine-cut corundum and shellac disk in the dental engine, if mounted on its mandrel absolutely true, so that it will pass over the teeth as smoothly as a soft rubber disk. When doing this, if a story be told or such an incident related as will suit the mind of your little patient and enchain his attention, and the cutting be by degrees, these surfaces may be rendered flush. Such surfaces may be treated, irrespective of any remaining decay, with the saturated solution of the silver nitrate without any filling at all. For such an operation moisture will be no detriment, and if a small amount of common salt can be carried to the surfaces and rubbed over the nitrate of silver it would be an advantage, as the addition of the salt would form a silver chlorid, which would leave a polished though blackened surface.

As these blackened surfaces are objected to, such cases may be treated as follows: The surfaces must be made absolutely dry, and, instead of an application of nitrate of silver, paraffin is well rubbed over the surfaces with a heated burnisher. Dr. Bonwill has advanced this idea of the beneficial effects of paraffin, stating that it enters the tubuli of the dentin and thus arrests decay. It must, however, be applied to an absolutely dry surface, otherwise it is ineffective.

We have given above our mode of procedure in the cases considered. In answer to the question, "Why?" we may only say that we advance the treatment because it has been successful with us. We cannot enter into the consideration of why gutta-percha does this, why silver nitrate does that, or why paraffin does the other. Such questions may suit the abstruse without materially adding to our knowledge. What we want is success, and if we are successful it does not seem to us that the consideration of the "why" in this case matters much.

Nevertheless we do not wish to "beg the question," as we always like to know the "ins" and "outs" of all things, and believe that it is not well for one to use a drug because Dr. So and So said it was good. We should know why we use it, irrespective of Dr. So and So; but, as I have seen gutta-percha preserve a tooth although worn to a wafer as thin as paper, and seen the beneficial action of silver nitrate on decayed dentin, I would be as much at a loss to answer why it does this as I would be to answer why a non-cohesive gold filling resting in a cavity so loosely that a needle would not only pierce it, but would as readily dislodge it, yet preserves the tooth in the locality in which it is inserted. These things we all know and have seen, yet how many of us can answer the why?

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A five-minute paper upon such a prolific subject must of necessity be concise, hence to the practical treatment of the temporary teeth at once.

These will be divided, from a clinical standpoint, into classes: A, good; B, bad; C, very bad.

Class A. Good teeth, of course, are those to which, profiting by our teachings, the mother has given good care and the little patient brought to us at an early age, say two and a half years. At this period the teeth are in perfect order, clean, and pleasing in appearance.

The patient is examined every three or four months, and from time to time a spot of decay may appear in the crowns of the molars, which is filled at once with amalgam, however tiny the cavity may be. At the same time, whenever necessary, all the exposed surfaces are polished with orange-wood and pumice, or the engine and a rubber cup may be used. The approximal surfaces are also kept bright by pumice and floss silk.

The incisors, under this care, remain perfect until shed.

The treatment these teeth receive is mostly preventive, and the time (and money) so spent is well invested.

Class B. These patients are brought to us probably after a night of suffering, and say at five years of age, and bespeak at once the neglect they have endured with compound approximal cavities in the molars, pulps nearly or quite exposed, and perhaps an abscess in progress of formation. The incisors also may be involved. The patient is not a type of good health, but nervous and afraid of everything in the office, ourselves included.

The first step to be taken is to gain the child's confidence, which can only be accomplished by inflicting no pain at the first visit. Some small crown cavity (usually to be found) is slightly prepared and filled with cement, and the patient is greatly encouraged by the idea of having had a tooth filled without pain. By the time all of the other work is completed this filling (?) is to be removed, the cavity properly prepared and filled with amalgam.

The large compound approximal cavities are in due time prepared as thoroughly as possible, care being taken not to expose the pulps; they are cauterized one or more times with silver nitrate, filled with amalgam if safe, or, if not, with a chlorid of zinc cement. If all progresses smoothly, at the end of six months or a year they may be refilled with amalgam.

Sometimes, when the teeth are crowded, after cauterization, gutta-percha is packed into two facing compound approximal cavities and allowed to remain for a month or more, when a filling can be more satisfactorily inserted.

If the pulps are exposed after the use of the silver nitrate, a cream of oxid of zinc and creasote is flowed over the exposed portion previous to the insertion of the filling.

These pulps, if thoroughly exposed, will die, but probably painlessly, and the tooth may remain comfortable for some time.

Any tooth in this condition at the age of five will not survive its period of usefulness, but must be lost sooner. However, if the second molars can be held in place, at almost any cost, until the first permanent molars have come through and are well articulated, this should be done, after which their loss is not so serious.

It is not my practice to fill the root-canals of temporary teeth, consequently the treatment of these teeth is merely palliative; when that fails to give relief, extraction is resorted to.

Class C. Under this we will describe a poor little sufferer of two and a half years of age, with all the teeth "rotted to the gums," as we are told, and which description is in fact more accurate than elegant. True enough, the crowns are gone, but in many the pulps are still alive and exquisitely sensitive. Here nothing can equal the cauterization by silver nitrate, which, repeated at intervals, will allay the sensitiveness, and is all that can be done for the little sufferer.

When a girl who has been under my care since childhood marries, she is impressed with the necessity of caring for her children's teeth. She is taught to brush, not rub with a rag, the infant's teeth from the time of their first appearance; at first with clear water, and later, when the child is old enough not to attempt to swallow everything that is put in its mouth, with prepared chalk. Floss silk should also be passed between them daily, and when the child is old enough the mouth should be thoroughly rinsed with diluted lime-water night and morning. This constitutes the care the mother is instructed to give the temporary teeth, besides which they should be sent to me for an examination three times annually.

The Permanent Set.—The judicious treatment of the first permanent molars is of paramount importance. In my practice there is a tendency to crowded arches, and very frequently the extraction of four teeth becomes advisable.

If the first permanent molars erupt in a defective condition, which they very frequently do, and break down immediately, they are nursed along until the patient reaches the age of eleven and then extracted. Removing them at this age leaves the twenty anterior teeth for mastication, and allows of the eruption of the second molars in a perpendicular position and almost in the places of the first molars. Meanwhile the bicuspids have dropped back a little, and the entire arch at the age of fifteen is roomy and in good condition.

If the first molars are removed after the appearance of the second molars these are sure to tip forward more or less, and the crowded condition of the anterior teeth is not so readily overcome, and, altogether, a bad result is sure to obtain.

For nearly twenty years the judicious extraction of the first permanent molars has been practiced by me, and the satisfactory result so obtained is a daily object-lesson among those patients who are still in my care.

When the first molars are good one set of the bicuspids, either the first or second, are oftentimes removed with the best results.

As the teeth of the permanent set are erupted they are watched carefully, at least two visits a year being insisted upon. The smallest pits that penetrate through the enamel are filled at once. If these occur before the teeth are fully erupted they are filled with oxychlorid of zinc first, and later with amalgam or gold. If the teeth are soft, gold is never used. Amalgam is a very satisfactory material for the fissures of bicuspids of children.

Sometimes these buccal and fissure cavities are quite deep, though the enamel-margins are quite hard; in which cases the cavities are lined with either gutta-percha or cement, usually the latter, and gold or amalgam completes the filling.

When all is ready for the filling the cavity is swabbed out with creasote (Morson's only), and then dried with hot air. This will leave the walls in a glistening condition; and if any spot of decay or softened tissue remains will at once discolor it, and it is removed.

When very deep cavities are found the enamel-borders are prepared thoroughly, but the decay over the pulp is not entirely removed for fear of exposing the same. This is coated with a cream of oxid of zinc mixed with creasote, and dried and covered with oxychlorid. Later a part of the cement is cut out, and amalgam or gold packed over the remaining protecting layer.

The oxychlorid of zinc is a treatment of the tooth under which the tooth will improve. The zinc phosphate is a filling-material only, porous to a certain extent, and does not benefit the tooth otherwise than serving as a filling-material.

The approximal surfaces are watched carefully, and upon the slightest suspicion the teeth are wedged apart and the discoloration removed with fine polishing strips; after which the surfaces are brought to a high polish by the use of lamp-wick carrying moistened pumice. A carrier for this purpose devised by my father some thirty or more years ago I have never seen equaled, so I present one for your inspection.

Approximal cavities in children under fifteen years of age are never filled with gold, but with oxychlorid of zinc. Usually the dam is applied, the fillings inserted, patient seated in another room with a book or magazine for from forty-five to sixty minutes, the mean time being employed on other patients, and so is not wasted. The cement is then carefully finished, and paraffin burnished on with a hot instrument.

It is not unusual to find at the age of twelve or thirteen years cavities on the approximal surfaces of all the lower incisors, and even cuspids. Experience and observation have taught me long since that gold will not save such teeth at all, while the above treatment will. I have during this past month filled such teeth with gold for a miss of nineteen years, for whom they were filled with cement in May, 1888, or ten years ago, the cement fillings having wasted but slightly during all this time, and the teeth in the best of condition.

It is essential that a child be taught how to brush the teeth properly, and for this purpose I keep in my cabinet a tooth-brush and set of teeth mounted on continuous gum, and with which I give a careful object-lesson.

Finally, when all other work is completed, the teeth are thoroughly cleansed and polished, and great stress laid upon the necessity for the patient's keeping them in that condition.

I am told that the teeth of children in this section will not stand the same treatment as those in the North. Of this I know nothing personally, but of the utter failure of gold in children's teeth I do not judge by my own work alone. Scores of my little patients go off to school, and have gold fillings inserted by operators of the best reputations, which, however, soon fail. So my hearers of a distant clime must please bear climatic considerations in mind when criticising my methods, and also my work when it falls under their view.

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Tin has physical properties which render it desirable as a filling-material; it is about one-fourth as tenacious and malleable as gold. Again, gold is nearly four times as good a conductor of heat, and six times as good a conductor of electricity; and its capacity for absorbing heat is nearly twice as great. On account of its pliability it is easily adapted to the walls and margins, and a perfect fit is made, thus preventing capillary action and preventing further caries. Of all the metals used for filling, it is the best tooth-preserver and the most compatible with tooth-substance, and it does not change form after being packed into a cavity.

Tin possesses antiseptic properties which do not pertain to gold for arresting caries in imperfect teeth, and, owing to its therapeutic quality, and being a rather poor conductor, there is a strong probability of calcification taking place under it.

In a few cases tin does not discolor, in others it presents a grayish appearance, but in the majority it is more or less blackened on the surface, the metallic oxid penetrating the dentin slightly and acting as a protection, because it is insoluble; but in either event the tooth is preserved. If the cavities were sensitive when filled with tin, and in future years it is removed for the purpose of filling with gold, it is generally found that the sensitiveness has disappeared.

Many failures are made in filling the anterior teeth of children with cohesive gold, but if we work as carefully and try as faithfully with tin good results would be produced and many teeth would be saved; and, as tin can be cut easily, more cervical margins would be finished smoothly. The objection that tin is too soft does not have any great weight when used for approximal fillings which do not include the incisive edge or occlusal surface.

For some time we have been using foil, prepared according to our suggestions, manufactured by The S. S. White Company as a special product; with it a filling can be made which is nearly twice as hard as the ordinary tin filling. This foil is more tenacious and cohesive than any we have ever seen. For eight months it has given complete satisfaction in the Western Reserve University

Dental College clinic, and in the technic work it has entirely superseded gold foil.

The idea that gold is the best filling-material in all cases has been completely refuted by the "New Departure creed;" therefore it is our duty to fairly consider and faithfully try other materials, to the end that we as dentists may be able to save a larger number of carious teeth.

Good tin foil, in proper condition, is cohesive when force is applied, and can be used for filling in the same manner in which cohesive gold is used; and a tin filling properly condensed, layer by layer, is a solid mass which can be cut or filed. Cavities are generally prepared the same as for gold, then a strip or tape, narrower than the orifice, is folded once or twice at the end and placed where the filling is to be commenced, the tape being folded back and forth as the operation progresses by hand-mallet or hand-pressure; the finishing to be completed the same as for gold. For filling with a hand-mallet use instruments with medium serrations, and a steady, medium blow with a four-ounce mallet; in force of blow we are guided by thickness of tin, size of plugger, depth of serration, strength of cavity-walls and margins. The best results are only obtained by having absolute dryness.

Filling the anterior teeth of children with tin has been practiced by the writer more or less for thirty years, and he is convinced that such operations are practical and durable, and will last from five to twenty years, according to the quality of tooth-structure, size and location of cavity, care of the teeth, environment, and care with which the filling is inserted. In "Tin Foil and its Combinations for Filling Teeth," recently published by The S. S. White Company, cases are recorded where tin fillings have lasted forty years.

Up to the age of fourteen years we find many teeth which are imperfect in structure; in such cases we advise tin, for as the patient advances in years the tooth usually becomes better, so that, if desirable, the fillings can be removed and saving operations made with gold. By treating cases in this manner very little, if any, tooth-structure is lost.

In filling these anterior teeth we suppose the cavities have been taken before they involve the incisive edge, but if the edge is involved the tin should only be rounded out, no attempt being made to restore a corner.

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Materials, oxyphosphate of zinc and gutta-percha. Why? Because they possess more of the qualities requisite for the preservation of the teeth under consideration than do any others. For instance, we need a material which may be easily and quickly inserted, and which is comparatively cheap. This requirement is fulfilled by both.

In most cases a good non-conductor is demanded. This quality is possessed by both.

Adhesiveness is very necessary. Oxyphosphate is adhesive to a remarkable degree; gutta-percha may be made so by swabbing the cavity with chloro-percha, or even chloroform, just before inserting the filling. Both retain their colors. Each possesses an advantage over the other.

Oxyphosphate, being harder, resists friction better than gutta-percha, but the latter is not so readily dissolved. Of the two materials, the former would be indicated in ninety per cent. of cases. In fact, we could do better service for the cases under consideration with oxyphosphate of zinc alone than we could do without it, though we had access to all other filling-materials.

Temporary front teeth are usually so small that when a cavity has formed sufficient to require filling the layer of dentin between the floor of the cavity and the pulp is so thin that, even if all the decay could be removed, amalgam would be contraindicated on account of the influence of thermal changes conducted by the metal.

But in few such cases can we do more than remove the bulk of decay, and that around the margins of the cavity. In many cases we cannot do even that much. But suppose we can; the cavity is seldom of a shape to retain a metal filling, and so shallow that a gutta-percha filling would soon be worn out. But in such cases, and in many where we may not be allowed to remove any of the decay, owing to the sensitiveness of the cavity or the tender age of the patient, we can usually dry with absorbent paper, spunk, and warm air, and fill with oxyphosphate of zinc. This will adhere to the cavity though there be no other retention, and while it lasts will preserve. It has the advantage of being easily renewed. By the time a set of fillings have dissolved out of such cavities we have the advantage of the advanced age of the child, and in many cases disappearance of sensitiveness or loosening of the teeth, to be replaced by their permanent successors.

In the case of front teeth of children having their permanent set, gutta-percha can be more frequently used to advantage than in the case of temporary sets. The teeth are larger, the child older and more controllable.

Again, we have extreme sensitiveness of teeth and nervousness of the child to contend with. But if both conditions were absent I should not recommend gold nor amalgam; the former on account of the tediousness of insertion and liability of the teeth to decay around it, the latter on account of its liability to discolor the teeth.

By means of gutta-percha and oxyphosphate of zinc we can easily preserve those teeth until they have become more dense, and the child grown beyond the danger of being influenced in its general health by infantile diseases.

The age at which these teeth may be permanently filled will be governed by the condition of the teeth and the general health and development of the child. Under the most favorable conditions I seldom fill children's teeth with gold under fifteen years, and in more cases wait until he or she be eighteen or twenty.

DR. T. B. WELCH, VINELAND, N. J.

The hardest part of this business is to get the children. It needs tact and patience, and even then the darling little creatures will slip between your fingers. They have heard you were the devil, and, if they have not been told so, they instinctively believe it. Therefore your first business is to convince them that you are their friend. But how can this be when your whole business is torture? Who can blame them for setting up their tremendous will against your murderous assaults? Put yourself in their place, with their ignorance and forebodings, and very likely you would be as childish as a child. Even with all your judgment matured as to what you ought to do, and what you must do, and what you mean to do as soon as you get ready, how difficult it is to submit to the inevitable in the dental chair. You hesitate and resist and postpone; you try and try, and draw on all your physical and moral courage, and get ready, and again get ready, and yet again, and still seek to escape.

We should have more patience with these little ones. If we gave them more sympathy for their sufferings and fears and cowardice, and gave them more kind-hearted tenderness in our treatment, we could better control them. Ridicule their fears as we may, deceive them as we may, catch them with guile as we may, we cannot say all their forebodings are ill-founded. We know they are to go through a terrible ordeal, and we may as well acknowledge it and seek to prepare them for it. Even little children can be philosophers. They can tone themselves up to endure pain if it is the inevitable. Prepare them for it, and it will be to them a life-long lesson of endurance and courage and triumph.

Having won your little patients to endure like soldiers, it is for you to make the torture as little as possible, especially at the first sitting. Disappoint them favorably. If there is actual toothache, stop it; if there is great sensitiveness, overcome it; if a tooth must be filled, make your work as superficial and temporary as it will allow; and as for extraction do it by magic, as well you may if nature has already done its part. Treat your little patients so delicately, sympathetically, and considerately as to prepare them to come the next time with confidence in you, and with their pockets full of courage and valor and confidence in themselves. Give them credit for all you can, and perhaps a little more than they deserve; then seal your good will by some little reward—small, cheap, and foolish to one older, but almost priceless to them because it is the proof of your sincerity and love. A dentist that has not a candy pocket is not wise; and he will have a drawer full of little dolls and balls and other trinkets.

But you ask, "What can I do when I *must* hurt, and not play at it?" We all have so many ways of turning corners where hurt lives, or of subduing it if we must tackle it, that we can almost always favorably disappoint our patient. It takes a little more time, but it will pay in the end. Yet there are times when it is cruel to dally and wise to do the inevitable promptly, leaving the soothing and explaining and reasoning till afterward.

In filling children's teeth gold is not necessary. Of course, if the parent is able to pay for the luxury, and the child is easily and willingly controlled, a gold filling may be inserted even in a temporary tooth to tickle the pride, but cheaper fillings are quite as good. Also, in preparing the cavity of decay, severe labor is generally unnecessary. There is much of softened dentin which might be left; to remove it would be needlessly taxing the patience and endurance of the child, causing unnecessary pain and making liable the exposure of the pulp. Base-plate red gutta-percha, or oxyphosphate as now made, is sufficiently durable. Tin is no better than gold; even common lead and tin foil is better and more easily manipulated. But a good amalgam or alloy is perhaps the best of all.

The immediate reward of treating children's teeth is perhaps less than any other of our dental practice, and its annoyances and hindrances are greater. Therefore, unless we can consider it as seed sowing, we shall be apt to slight our work and turn it away whenever we can. If we cannot win our children for the future, the less we have of them the better. But if we consider these little ones as our future patrons when young men and women, and still on as parents and men and women of society, we shall find an incentive to do our best, both in winning their affections and in doing good work.

Then, again, if parents are educated to bring their children to us early there will be little necessity for torture. It is because visiting the dentist is made a last resort for the relief of pain that the treatment becomes so painful.

We notice a few other points of special interest:

First. Are we not far too modest in calling the attention of parents to this subject? There are few who do not need educating, and there is scarcely a day that we shall not have fitting opportunity to show parents the importance of our early supervision and treatment of their children's teeth. They will thank us for our interest, and they will generally follow our advice.

Second. An article now and then in our local newspapers will be appreciated. We might add an addendum to our advice, so that our readers may not think we are advertising, to the effect that we hope those interested will go to the other fellow for their work.

Third. Bringing the importance of prompt and proper attention of children's teeth before the public schools is a way of doing much good. Teachers and superintendents and trustees are all aware of its importance, but my experience is that they neglect it unless we give it our personal attention. I have never spoken before a school on this subject without being thanked for my effort, and without afterward feeling the practical effect on my practice. It is still better if we first call the attention of some officer of the school to what we believe will be of interest to the school, and let them prepare the way for our favorable reception. Not to make a staid, elaborate, lengthy speech; a few thoughts, well chosen and aptly expressed, are much better, and will be more sure to be followed by an invitation to "come again."

Fourth. Our school-books on physiology and hygiene need revising. Information on this subject in these books is meager indeed, and the little that is said is evidently the effort of a tyro or a physician. Who will take this in hand? Complaint is on the tongue of every one who has given this neglect attention, but no one acts.

Fifth. Having it understood that you give special attention to children's teeth on Saturdays, when the schools have no sessions, is a good thing. I know dentists who make no appointments on Saturdays but with children, and it is generally a busy day.

Sixth. A little booklet setting forth this whole subject in a concise, familiar, practical way I have found of much profit. My first experience was in sending through the post-office one to each family within ten miles of my office. The cost was quite a sum, and it hurt my conscience awfully, of course, because I was advertising; but it brought in the dollars and enlightened many a parent; and if it were not for exposing others as advertising dentists I would add that hundreds of dentists have sent out the same little booklet with equal profit.

Become popular with children and you become popular with parents. The dear little innocent creatures will know no better than to tell all their little companions what a nice man you are, and how little you hurt, and show with pride a filling you may have inserted. And they will tell their older brothers and sisters, and in many ways become your living advertisements in spite of your determination not to be an advertising dentist.

The worst of it is, when patients are drawn to you by these little advertisers, you don't know how to excuse yourself with your more dignified professional brethren. But greatness has been thrust upon you; work will crowd you, and filthy lucre will overcrowd your safe, though you may protest that you have not been influenced by such sordid motives. It is too bad. And all this because you have become popular with the children.

How to Overcome the Difficulties in Dr. Jenkins's System of Inlays.

BY WM. HIRSCHFELD, D.D.S., PARIS, FRANCE.

It is now a little over a year since Dr. Jenkins presented his system of inlays to the dental profession. During this rather short period the invention has made its way through nearly every civilized country. All the dental societies have discussed its merits; most of our journals have published articles in its favor. A goodly number of operators, especially those who had an opportunity to see Dr. Jenkins himself at work, have adopted the new method and cannot praise it highly enough. And still, in spite of all that, there is the great mass of the profession who are perhaps inclined to acknowledge the practical value of this invention, but who hesitate to take it up as a feature in every day's practice. They consider it too complicated, if not too difficult. This opinion is not altogether erroneous. The operation as it ought to be performed, after the ideal of the inventor, is not so simple that every one who attempts it is sure to succeed immediately. Frequent failures are sure to happen to the beginner, and many otherwise skillful men will throw the whole thing aside after a few unsuccessful trials. Under these circumstances it seemed of general interest to find out if this work embodies real difficulties and what makes them. And while I am afraid that those who are familiar with it may not discover in this paper any especially new features, it is hoped that it may give the others some idea of how to perform the operation without any trouble.

It is the same with the study of porcelain inlays as with every other system of filling teeth. We must know first how to handle the material before attempting the operation in the patient's mouth. This is, at least, the idea of Dr. Jenkins, who advises every beginner to go through a scale of trial burnings of every color—on gold foil impressions from differently shaped cavities in extracted teeth—and compare the colors with the samples. Unless one has had the opportunity to see Dr. Jenkins himself at work, or some other dentist who has got his knowledge from the former, every man ought to follow this rule, and two good results will be gained thereby: One will become thoroughly familiar with the process of baking the enamel, and find out at the same time that the fused inlay will look somewhat different from the corresponding number on the shade sample. Particularly the yellow and whitish shades show a tendency to turn out a trifle lighter.

This peculiarity must always be remembered in choosing the color. For labial inlays take a slightly darker color than the tooth, while for approximal cavities, where the neighboring tooth produces a shadow, a little lighter color will give good results.

After having gone through this preliminary schooling, the operation may be tried in the mouth.

The base of success in porcelain inlays is, as every one knows, the exactness of the impression. The use of thin gold foil, as introduced by Dr. Jenkins, will give most perfect results, but unfortunately will cause a good many failures on account of its extreme thinness; the gold will be torn, it will stick to the gums, it will bend in removing the impression, etc. In nearly all cases these failures are not owing to lack of care or skill on the part of the operator, but to the neglect of one of the following conditions:

The want of space in approximal cavities.

Insufficient exposure of the whole outline of the cavity.

Defects in the borders of the cavity.

Defects in the internal shape of the cavity.

Sticking of the foil at either tooth or gums.

The preparation of the tooth with a view to obviating these faults represents the whole secret of successful impressions, and consequently perfectly fitting inlays. It is therefore necessary to study in detail what means we have within reach to overcome these difficulties.

For greater simplicity let us divide our inlays into two groups.

First. Labial cases, comprising front cavities and also side cavities in close-standing teeth.

Second. Approximal cavities, taking in all cases between two teeth.

To get sufficient space for approximal inlays, wedging with cotton or gutta-percha will be our first step. This should be continued until even more than the apparently necessary space is obtained. We gain by doing so another good result: the wedging material will expose well the cervical border of the tooth. For this latter purpose the gums must be pressed away by gutta-percha in those labial cavities where the upper margin is below their edge.

In very badly decayed (mostly dead) teeth it may be actually impossible to get a sufficiently free cervical border. To obtain at that point a satisfactory impression, the construction of an artificial border will of necessity impose itself. Amalgam packed in these "underground" parts and allowed to harden will be a good method to follow out. The amalgam ought to be trimmed up to a round edge just following the gum line. If the inlay fits tightly against this border, no further decay will occur and nothing show from the outside. As soon as we have a clear view of the whole surroundings of the cavity, we can proceed to the next step, the trimming of the borders. That is to say, trim borders of an even thinness all round, perfectly smooth and sharply defined. Too much care cannot be laid on this point, as the well-prepared edges must finally present to the eye a kind of frame supposed to encircle hermetically and support the future inlay. To do this part of the preparation well, Dr. Jenkins advises a set of Ash's diamond burs. I must say that the use of these burs has helped me immensely in getting excellent results. Their action is surprising; no file, no corundum, no sand-paper will ever produce the same exactness. With these pointed or round instruments one is enabled—provided they are constantly kept wet—to get edges beautifully beveled and produce a smooth, uninterrupted outline. All this done, the internal shaping of the cavity is to be attended to. A desirable plan is to form the interior like a more or less flat cup, with even walls, finishing in straight lines toward the edges. Undercuts must be avoided; wherever extensive caries has made them they have to be filled up by bits of red gutta-percha, which, of course, ought not to extend over the border. In too deep cavities it will be necessary to line out the whole inside with cement or gutta-percha to prevent tearing of the foil.

Here comes into consideration another most important detail. In spite of perfect walls and edges, the impression may not come out without bending. This will happen in all cavities where the outline from one extreme end to the other goes beyond a half-oval curve. Do not hesitate to remove the marginal structure in these cases sufficiently from either end to form the open curve.

The tooth prepared thoroughly in regard to all these different conditions will present now a cavity with a perfectly even floor, and walls finishing in a well-defined, sharp outline. To reproduce faithfully this latter must be the special object in taking the impression. The application of the rubber-dam is not absolutely necessary in order to get a good impression. Still, in approximal cavities, especially bicuspids and molars, this would make it easier. For labial inlays one can do without it; only precautions should be taken to prevent sticking of the gold to the gums by applying to them a light film of vaseline; it is unnecessary to apply it also on the tooth, which simply ought to be perfectly dry to allow the foil to slip off easily.

It will require a little practice to cut out the right sized piece of foil. This should be just large enough to show off clearly the whole border of the future inlay. There sometimes may be difficulty in getting the cervical border (between the teeth) well marked in the gold. Good results can be obtained by following strictly the way I saw Dr. Jenkins taking the impression for an approximal case in a lateral incisor. After having cut out the suitable piece of foil, he doubles over one of its narrow ends just as far as the distance between the two teeth. This little detail has its great importance, as that folded part will become a sort of a reserve into which to impress the cervical edge. He then slips the foil in as far as the gums, and presses the doubled-over part right against them. This is the first hold. His next consideration is to mark the labial border. With his pliers he burnishes the gold foil all along the outside of the tooth, and now only begins forming the inside impression by filling up the whole cavity with soft spunk. He will take first small pieces to express well every corner, and finish up with bigger pieces, and in that way will finally hold the whole matrix tightly wedged up. This enables him to burnish safely his gold over the inner tooth border; in fact, wherever it does not stick firmly on the tooth. At this moment, while the gold is still held firmly in place, opportunity is afforded to clip up with a sharp excavator the free border of the gold wherever it reaches too far over the tooth. The impression is thus prevented from getting too voluminous to slip out easily between the teeth. This done, empty the mold of the spunk and examine carefully. If you see every part of the outline well marked on the gold you will notice in deeper holes slight tearings of the gold; do not mind it. As long as those defects do not involve the edges, your inlays will not be injured. On the contrary, those slight tearings will allow the asbestos to get in the impression and cause little grooves in the porcelain, which will help the inlay to set well in the cement.

There is a little knack about working the impression out of the tooth. One must be careful to loosen the whole matrix in one snap before letting it drop out. A fine, well-pointed excavator stuck in the bottom of the gold will serve for doing this. The moment you see that your impression sticks at some place do not try to get it out, but rather set it well back in its place and then loosen first this special corner before trying to withdraw it altogether.

It seems to me, after an experience of nearly a hundred cases, that with the strict observance of all these details every impression ought to come out right. Still, failures will happen to every one of us from time to time, owing to the cobweb-like thinness of the foil; a little perseverance alone will help to perfection.

The next part of the operation—the burning of the porcelain—is by far less troublesome to accomplish. Success depends here upon the manner in which the impression is put in the asbestos. This should cover the free margin of the gold, to give it a firm hold in the tray. The object in doing so is to prevent moving of the foil or bending while the paste is being put in. Great care must be taken not to let the asbestos cover the outline of the cavity, which must remain clearly visible during the whole process of burning. Before undertaking to fuse the powder, perfect dryness of the asbestos must be secured. This may be hastened by holding the tray over a Bunsen burner until it does not steam any longer. To get perfect inlays great pains should be taken in limiting the porcelain paste strictly to the edge of the impression. Whenever flowing over of the porcelain is noted it should be allowed to dry, and then the overflowing parts be carefully removed by means of a fine camel's-hair brush. If this detail is omitted final success will be compromised, as these outgrowths, as I might call them, will prevent the inlay from going home easily.

Since several burnings are necessary, there is no need of filling up the impression immediately so as to represent the finished inlay. The first burning, at all events, is bound to shrink a good deal, but at the same time ought to be burnt thoroughly, showing just as smooth a surface as after the final melting.

After the second burning it is well to compare the porcelain with the chosen color. If a difference is observed finish the third burning with another number, which may be lighter or darker, according to the case. A mixing of colors will give very artistic results in those cases where the inlay is to replace a large part of a front tooth. In such cases it is better to choose then an artificial tooth as nearly identical as possible with the patient's tooth, instead of a porcelain powder number. Having this plate tooth constantly at hand during the whole process of burning makes it easy to reproduce in an inlay the two different shades which human teeth generally show.

The foil removed from the fused inlay, the next step is to make the undercuts. The most suitable instruments for this purpose are the White's diamond fissure burs five-sixteenths of an inch width. They will give beautifully even cuts in whatever direction they may be needed. The making of one deep cut in flat inlays from one end to the other is to be avoided, as they may cause breaking of the inlay in setting it. Before definitely setting it, the inlay should be tried in regard to the good fit of the edges and articulation. If the borders of the porcelain do not hermetically close up every part of the cavity, the whole operation should be done over again. To do such an inlay over will be hard for the busy dentist, but the final success of the work depends entirely upon beautifully fitting edges and that the cement is only meant to hold the porcelain in place, and not to form a part of the filling. For the same reason the cement used for setting—no matter if it is Harvard, Weston, Baldwin, etc.—must be mixed to the extreme limit of thinness. A mere suspicion of almost water-like cement is alone supposed to remain between the tooth and the porcelain. Harvard cement, with its different shades to meet the principal tooth colors, seems to be the most suitable, only it should not be forgotten that this thinly mixed cement takes a long time to set. At least from thirty to forty minutes the action of the saliva should be shut off. It is therefore almost impossible to do well without the rubber-dam. To dismiss a patient a few minutes after having set an inlay by simply protecting it with some kind of a varnish is sure to interfere with the solidity of the filling. The patient may be left for half an hour in another room, after having reduced the rubber-dam to a fragment just sufficient to cover the tooth and those adjoining it, so that the operator may easily occupy himself with another patient, and the work is thus done without taking up too much time. It will be noticed that the color of the inlay will look changed after the setting. It should be explained to the patient that the cement must be entirely crystallized, and that it will take at least twenty-four hours before the original color of the porcelain will come back.

Let us see now what conclusion the study of this paper may suggest. It is the fact that the whole process, as Dr. Jenkins has laid it out to us, is not a difficult task even to the operator of less than average skill, but an operation which requires a conscientious carrying out of every single detail. It is an operation which can only turn out successfully if the operator is willing to devote to it the necessary time. The work as presented above may seem complicated, but that is only in appearance, and not in reality. After a few operations are conscientiously worked out, all the different requirements will easily be met. The dentist who succeeds in this new specialty will be largely rewarded by the immense satisfaction which a well-placed porcelain inlay will procure. Both operator and patients will be far more pleased by an accurately fitting inlay than by the most elaborate gold filling.

Dentistry has made, through Dr. Jenkins's invention, an immense step toward perfection in filling teeth, and while it will not do away with gold altogether, gold will be looked at as out of place wherever a porcelain inlay comes in comparison with it.

IDENTIFICATION OF BODIES BY THE EXPERT DENTIST.

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(Read before the American Dental Society of Europe, August 4, 1898.)

THE practice of legal medicine presents few instances more apt to exert its sagacity than those relative to the proofs of identification. It is especially the case when a medical jurist, placed before the remains of a corpse consumed by time, or the incomplete fragments of a skeleton, finds himself confronted with the necessity of reconstructing, with only the aid of science, an individuality whose principal forms, the outward characteristics, have been destroyed. It is especially in these obscure and difficult cases that the medical jurist must draw, not only from precise anatomical knowledge, but also from a minute and attentive study of the most unimportant particularities of the case, the elements of an enlightened judgment.

"The examination of a skeleton, in all researches concerning the proofs of identity, constitutes, therefore, in reality one of the most delicate questions which medical jurists may be called upon to resolve." These masterly words were those with which Tardieu began his "Observations sue l'examen du squelette, dans les recherches concernant l'identité." (*Annales d'hygiène publique et de Médecine légale,* 1849, p. 434.)

The authority of such a writer will render it unnecessary to insist more at length on the difficulties which the reconstruction of identity may sometimes offer. If to that we add the social and civil importance which the identification of a living body or of a corpse presents, we shall naturally be induced to conclude that the medical jurist must neglect none of the sources of information at his command.

In this order of ideas legal medicine, which society has intrusted with this important work, must bring to its aid every branch of science. Among the means it can call to its aid in cases where identification presents real difficulties one of the most important is, doubtless, our dental art.

Up to date, and according to us, legal medicine has not sufficiently laid under contribution the services we are able to give. Our wish is that our voice should be heard, and that medical jurists should call upon our branch of science in difficult cases.

Recent examples, the description of which will be found in our treatise, prove, moreover, that dentists can be of considerable use.

The identity of corpses by means of the teeth has produced many and important works, especially during the last few years. The authors of the beginning of this century seem, in fact, to have neglected to make use of the indications furnished by the dental system relative to the identification of bodies. Treatises on legal medicine do mention the signs of dentition in determining the age of a person, as also the various particularities of dental organs susceptible of being made use of by a medical jurist. But they do not attach to it, according to us, a sufficient importance.

As will be shown by the observations which we have related in our treatise, the cases in which the teeth are the only practical means of establishing an identity are most numerous. Such catastrophes as the burning of the Ringtheater (Vienna), the Opéra Comique (Paris), the Charity-Bazaar (Paris) have been necessary to draw the attention of the authorities on this point; and it is only since these various accidents that authors have studied the question.

The list of authors who to our knowledge have treated of identification by means of the teeth will be found in our bibliographical index. In foreign countries the works of Saunders, Thompson, Grady, Barrymore, Platschick, Mela, Flori; in France those of

Viau, Godon, the thesis of Dumur, Montfort, Merciolle. The writer has had occasion to insist upon it at the last International Congress of Moscow, and at the Paris Dental Congress of 1897.

The part of the expert dentist in establishing an identity cannot now be regarded with doubt; the observations which we have recorded in "L'Art Dentaire en Médecine légale" form a sufficient number of proofs. Now it is some particular anomaly, known to the dentist alone, which will serve as a foundation to his conclusions; again some restorative operation will achieve the same object. But it will also be seen, on reading these observations, that if dentists have been called upon to further the ends of justice their services have often been required only at the last moment, and in many cases they have not been consulted at all. In numbers of cases identification could have been proved by dentists, thanks to the means at their command.

Thompson, in his article in the DENTAL COSMOS, insists on this point, and adds that many long and costly law-suits might thus have been avoided. He mentions the famous Hillmon suit, which was kept in suspense for more than fifteen years before the various courts of the Western states, and in which the mold of the teeth showed at last the dentition of the supposed body to be perfect and regular, whilst that of the real Hillmon was irregular and incomplete. In this case the body was so disfigured that any other hope of identification by other means would have been useless. If the examination of the dental system had been made in the beginning, all these troubles would have been avoided.

In the Goss-Udderzook case the missing person, Goss, had all his teeth at the time of his disappearance, and the body submitted to the experts had had none for a long time. Notwithstanding the declaration made by the dentists, the court admitted that the body was that of the missing Goss, thus obliging the insurance companies to pay the insurance. These latter appealed, and meantime the body of the real Goss was found, murdered by his brother-in-law. It was then admitted that the dentists were right.

Again, the intervention of the expert dentist can be the means of relieving the family from painful surprises. In catastrophes such as that of the Opéra Comique or the Charity-Bazaar, the victims are crowded one upon the other, and it is almost impossible to recognize them. Mistakes may take place, not only most cruel to the family, but terrible also in their material consequences. It will be remembered that after the fire at the Charity-Bazaar a body was recognized as being that of Mrs. Haussmann, and carried away as such by the family, when all at once it was found that a mistake had been committed. The funeral ceremonies had already been performed, and it is easily understood what consternation such mistakes can bring on the minds of those already so cruelly stricken. It was afterward proved that the mistake would have been prevented if the dentist who had attended the unhappy victim had been called upon to identify the body.

Yet there are numerous cases where the knowledge of the dentists was put to the test, and with complete success. In one series of cases the examination had a negative effect, still of a great importance. Thus, in the case of Louis XVII, the examination of the dental system showed that the remains at the Ste. Marguerite Cemetery were those of a man much older than the Dauphin would have been. The legend wrought around this corpse thus fell at once to the ground. In another series, on the contrary, the results were most positive and quite demonstrative to the point, in view of identification. We have only to mention the well-known cases of the Prince Imperial, identified by Dr. Evans; the Marquis of Morès, identified by Dr. W. Davenport; the Duchess of Alençon, identified by Dr. J. T. Davenport, and other victims of the Charity-Bazaar.

We shall conclude here our considerations on the part played by the expert dentist in cases of identification. Its importance cannot be mistaken, and no doubt in future will not be called upon in difficult cases by chance only, but dentists will be consulted right at the outset in order to avoid painful surprises.

Identification has such a great humanitarian and social importance, as is proved by the legislations of the different countries concerning missing persons, that medical jurists are bound to utilize all means furnished in its behalf by dental science. The family whose head has disappeared and is not able to prove his death by an official document, or even having his body identified, finds itself in a most painful situation, and that on account of the legal dispositions.

The French civil code of laws distinguishes in the case of absence three distinct periods, and by the word "absent" it means any person on whose life there is a doubt.

First. The presumption of absence. This period opens as soon as there are serious doubts as to the existence of the missing man.

Second. The declaration of absence. This is made known by a judgment, which can only be given five years after the disappearance, or the last news from the missing man.

Third. Definite possession act, which can only be obtained thirty years after the judgment of declaration of absence, or one hundred years from the missing person's birth.

In other countries the laws on absentees differ but slightly from the prescriptions of French law. In Belgium and Mexico the laws on absentees are almost the same as in France. In Italy, after three or six years' absence, the heirs can, under due caution, be placed in provisory possession, but the final possession is only given after thirty years' absence, or one hundred years after the birth of the absentee, as is the case in France. Almost the same takes place in Spain; two to five years for declaration of absence, at the request of the heirs or persons having a right to his property, subordinated to his death, and thirty years to declare the presumption of decease. This decision becomes final six months after publication in the official papers. In Scotland the same thing occurs; the details only are different. According to the law of the 22d of August, 1881, after seven years' absence the heirs can be placed in possession of the missing man's revenues, but only after fourteen years can they take possession of the movable capital, and twenty years after of the estates. Other laws are less severe as to the number of years required, but the difficulties are the same.

In Sweden, if no news has been received of a person for twenty years, the heirs can request the judge of the district where the absentee lived to declare the decease. The request is published in the papers, the absentee is called for, and if one year after—that makes twenty-one years—no news has been received from him the heirs can enter into possession. In case of a person having been severely wounded or has suffered shipwreck, and no news of him has been received for five years, the request can be made, and one year afterward—that is six years—the decease is made known.

In Russia, as soon as a person is missing from his home, any person having a right to the succession of the absentee may take steps with the jurisdiction of his department to insure measures of conservation. If the court esteems that the proofs are sufficiently clear it names a trustee, who has charge of looking after the absentee's property and make the necessary publications to find out his whereabouts. Five years after the first publication the court, after a minute inquiry, declares absence, if necessary.

In Germany, Austria, and Switzerland the laws on absentees vary but little from the French ones, inasmuch as after a period of incertitude, during which the interests of the absentee are placed under the management of a trustee, it ends, almost always, in a judicial declaration of decease, which has almost the same effect as the proof of his death. After a certain time of absence the court of the absentee's county, after due inquiry, pronounces a declaration of decease.

The procedure and details vary according to the laws of the different countries, but the courts surround themselves, on principle, with every possible proof before making a declaration of death, taking due consideration of the circumstances in which the absentee has disappeared, and his age at the time when news ceased to be received from him. The succession of the absentee is considered opened from the date fixed by the court. As to his wife, she is considered a widow.

In England absence does not make an object of any legal dispositions. When such takes place, the interested persons take the property and business of the absentee in hands under their own risk and peril. There is no such thing in England as provisory or definitive possession; neither is there any judicial declaration of a decease which has not been proved.

We may add that, according to the law on bankruptcies of 1883, absence constitutes a cause of bankruptcy.

In the Republic of Uruguay, according to Article 51 and following ones of the Civil Code, four years after the disappearance of a person his heirs can call for a declaration of absence. One year after this a judgment is given which makes the declaration of absence and puts the heirs in provisory possession. If after another fifteen years the absentee has not been heard of, the heirs are placed in final possession.

The laws of Costa Rica—in force since January 1, 1888—make a declaration of absence four years after the disappearance or the last news received from the absentee, and give the heirs provisory possession. If the absence continues for ten years longer, or if thirty years have passed since the birth of the absentee, the final possession is pronounced.

We think it useless to quote as examples the laws of other countries; it will be seen that, though the details are different, the laws are virtually the same everywhere; and, in view of business as well as of marriage, the results of absence can place the family of the absentee in extremely embarrassing situations, and this alone is a most important question.

No doubt the delays required by law will be lessened in future, for progress in means of communication is so rapid that a reform imposes itself. In fact, it is difficult to understand, with the telegraph, the new fast steamers, the perfection of the postal system, etc., why it should be necessary to wait thirty years in order to give the heirs of an absentee the full possession of his inheritance. Thus, we see, in Japan, according to the new code of laws, promulgated April 28, 1896, after seven years' absence "the court can, at the request of the interested parties, pronounce a declaration of absence." And this delay is even reduced to three years when the absentee "has been either engaged on a battlefield or has suffered shipwreck, or run any other danger which might have imperiled his life."

It is true that even in the above-mentioned countries, whose laws are most rigorous under this head, a want is felt to reduce, in certain cases, the severity of the law, as was the case recently in Spain, in relation to the loss of the man-of-war "Reina Regente." One year after the catastrophe the heirs of the five hundred victims were authorized to have the decease warrants drawn up. Even thus the reduction of legal delays, desirable as it may be, will only retard for a few years the terrible effects for the bereft families of the disappearance of a member, and the matter of establishing his decease will always have a capital importance.

This legal subject has carried us very far, and we will not lengthen it by treating of the prescriptions of absence in relation to marriage. Suffice it to say that, on principle, marriage can only be dissolved by the death of one of the parties, and that the other can only marry again with the proofs in hand of the decease of the absentee.

The authorities, as well as the medical jurists, cannot therefore be too careful to make all possible efforts in order to facilitate identification.

A FEW CONSIDERATIONS IN FILLING TEETH.

BY C. N. JOHNSON, L.D.S., D.D.S., CHICAGO, ILL.

(Continued from page 364.)

The Introduction, Condensation, and Finishing of Gold Fillings in the Different Classes of Cavities.

While each cavity is to a certain degree a law unto itself so far as the manner of building the filling is concerned, yet there are fundamental principles of procedure which if intelligently recognized will render the work more systematic and satisfactory. The methods herein suggested are not always applicable because of the constant occurrence of cavities unique in location and form, but for the so-called typical cavities of the different classes it is believed that if intelligently followed they will at least prove effective in the accomplishment of satisfactory work.

The arrangement in the cavity of the layers of foil constituting a pellet becomes a matter of some importance in its relation to the symmetrical growth of the filling under the plugger, and also to its resultant strength. It is with this idea in mind that the present plans of procedure have been suggested, as well as on the basis of expediency in the manner of building the filling.

To start any filling a rope of non-cohesive gold, varying in size as indicated by the requirements of the case, will be found effective. A convenient form may be made as follows: Divide a sheet of No. 4 foil twice, making one-third of a sheet; then roll into a rope about the size of a large knitting needle, and cut the rope in three parts. This makes a rope approximately an inch in length, and of a size that can be readily carried into most cavities of any extent. In small cavities the rope may be cut to the desired length.

When starting a filling the rope should be grasped by the pliers about one-fourth of an inch from the end, and this end carried into the angle of the cavity where it is intended to commence the filling. The rope will fold upon itself as it is pressed into the angle, so that it will remain there while the pliers release it and grasp it farther back and fold it once more into the cavity. This process is kept up till the entire rope is carried into position, where it may be condensed in the manner to be described when considering the details of filling building in the different cavities. Into the structure of this non-cohesive cushion may be wedged the first pellets of cohesive gold till the two forms of gold are so interlocked that they will not separate, when the filling may be completed with cohesive gold.

Simple Approximal Fillings in Incisors.

These fillings, when built from the labial aspect, are ordinarily best started in the cervico-linguo-axial angle of the cavity by carrying a rope of non-cohesive gold into this angle as already indicated. The rope should be folded upon itself from the starting point along the cervical wall toward the labial wall, till it is securely locked between the cervical third of the labial and lingual walls. If the cervical wall has been made flat there will be little difficulty in securing the rope in place. The first rope used should be of sufficient size to cover the entire cervical wall from lingual to labial, and extend well over the cervical enamel-margin. The office of this rope is to secure ready adaptation to the angles of the cavity, and also to form a non-cohesive cushion against which cohesive gold may be condensed without danger of injury to the cervical enamel-margin. In condensing gold over margins it should always be a cardinal principle to keep a sufficient mat of gold between the plugger point and the margin to avoid the possibility of injuring the enamel with the serrations of the plugger.

When the non-cohesive rope has been carried to place with the pliers it should be more securely locked in position by bringing a plugger to bear on it at two or three points with hand pressure, wielded in the rocking motion already described. The first direction of the plugger should be toward the cervico-linguo-axial angle, and the gold should be wedged into this angle with considerable force. If the rocking motion of the plugger is used the gold can be so locked into place as not to be readily moved by subsequent manipulation, but if there seems any doubt about its security a retaining instrument may be placed on the condensed gold the moment the plugger is withdrawn, and held there while the locking process is carried on by the plugger at other points. The next direction of the plugger should be toward the cervico-labio-axial angle, and these two points may be all that is necessary to condense at this time. The object is simply to lock the rope into the angles of the cavity rather than to attempt the condensation of the entire mass. In fact, too much condensation must be avoided until some cohesive gold has been called into service. After the plugger is withdrawn from the cervico-labial angle a cohesive cylinder sufficiently large to cover the entire cervico-lingual region should be laid with its side upon the non-cohesive gold, and one end looking along the lingual wall and the other along the cervical wall. This should then be forced into the substance of the non-cohesive gold in the direction of the cervico-linguo-axial angle, so as to incorporate the two forms of gold into one mass. After pinning this pellet of cohesive gold into the non-cohesive at several points with hand pressure, another cylinder of cohesive gold may be forced into the cervico-labio-axial angle in the same manner. These two pellets will usually reach across the entire cervical wall, but if they do not a third one may be used to connect the two. When there is a complete covering of cohesive gold over the non-cohesive the mallet may be used for the first time, and the entire mass malleted to place. The result is that the cervical wall is perfectly protected by a cushion of non-cohesive gold covered by a layer of cohesive gold, and the whole locked between the labial and lingual walls of the cavity with a slight excess of gold overlying the cervical enamel-margin to insure sufficient material for a perfect finish.

In building the filling from this point the pellets of cohesive gold should be laid with their sides looking toward the cervical wall and their ends looking labially and lingually, and each pellet should be wide enough to reach from the axial wall to the extreme approximal surface of the filling. With this arrangement of the pellets the condensation is in the direction of the long axis of the tooth, and the filling is kept sufficiently prominent on its approximal surface while it is being built down to avoid the necessity of subsequently adding any gold laterally to this surface to round out the filling. Gold tacked on the approximal surface of one of these fillings by laying the pellet on its side and directing the mallet force at right angles with the long axis of the tooth is not so securely maintained in place as it is where the arrangement of the gold is such that each pellet reaches from the approximal surface to the axial wall and is built toward the cervical wall. The operator cannot always avoid the necessity of arranging his gold so that the condensation is in the direction of the axial wall, but this necessity is usually confined to small fillings where the means of approach will not permit of any other arrangement, and where the element of strength is not so material.

One important consideration in building these fillings relates to the protection of the lingual margin. This seems to be the most difficult feature in their insertion, and it is where operators fail more often than at any other point. This failure is usually due to inadequate covering of the margin as the gold is being built along the lingual wall toward the incisal angle. A slight excess of gold should invariably be carried over this margin, and in order to be assured of this the operator should keep the gold in the lingual region built somewhat in advance of the filling at the labial margin. That is, the gold should extend farther incisally along the lingual than along the labial wall, so that the operator may clearly see the lingual margin and thus be certain of lapping the gold over it. If the labial part of the filling be built in the least advance of the other, it obstructs the view of the lingual margin and prevents access with the plugger.

As the filling is being built down toward the incisal angle, the operator must have a care not to approach too near the angle before wedging some gold into the angle and between it and the filling already in place. If the cavity is deep pulpally, so as to leave an appreciable pocket between the condensed gold and the incisal angle of the cavity, it is advisable to use a short rope of non-cohesive gold to wedge into this pocket to be assured of perfect adaptation. Into this non-cohesive gold a small pellet of cohesive gold may be forced with hand pressure, and the filling completed with the mallet.

When a filling is thus inserted it will be found that there is a slight excess of gold overlapping the margins of the cavity, and the final step in condensing such a filling should be to mallet down this gold with a foot plugger. If access cannot be gained with a plugger a very thin burnisher may be used to force the gold to place, burnishing from the center of the filling toward and over the margins. Then the filling is ready for polishing.

In cavities where the lingual wall is missing and the labial wall perfect, so that the filling must be built from the lingual aspect, the same general principles of filling building may be followed, except that the gold should be started in the cervico-labial region instead of the cervico-lingual, and the filling kept more prominent along the labial wall as it approaches the incisal angle. The same care must be exercised in lapping an excess of gold over the labial margin while the filling is being built that was advised for the lingual margin while building from the labial aspect. It is well-nigh impossible to tack gold on the labial region of the filling after it has been built down to the incisal angle, and the operator should therefore provide perfect protection to this wall while he has the opportunity.

In those cases with the lingual wall missing but the labial aspect so open that the filling must be built mostly from this direction, the gold should be started in the regular way, and as the lingual margin is being covered a portion of each pellet should be allowed to extend some distance over the margin and hang beyond the lingual surface of the tooth. This end of the pellet cannot be condensed from the labial aspect, but the portion reaching into the cavity can be made fast to the filling and the filling built as full as convenient from this aspect. When the labio-approximal portion of the filling is built to form it will be found that from the lingual aspect a large mass of uncondensed gold extends lingually beyond the margin, each pellet of which is securely fastened into the substance of the condensed portion of the filling. This uncondensed mass will ordinarily not contain sufficient gold to properly round out the filling when malleted to place without the addition of more gold, and it is the addition of this gold from the lingual aspect which often proves troublesome to operators. To avoid difficulty of this nature it is suggested to take an annealed pellet and force it with hand pressure up into the structure of the uncondensed gold before malleting the latter to place. If this be done the freshly annealed pellet will leave a surface to which, if necessary, more gold may be attached with greater certainty than where the uncondensed gold has been malleted without this precaution.

The object of leaving this excess of uncondensed gold is to enable the operator to interweave the freshly annealed pellets into its substance, and thus prevent flaking of the lingual portion of the filling, which is likely to occur where an attempt is made to condense the gold as the filling is being built down, and then add more gold to the condensed surface from the lingual aspect. Wherever possible the practice should be avoided of leaving for any length of time a condensed surface of gold exposed to the atmosphere with the expectation of subsequently adding more gold to it. The property of cohesion seems to be more or less impaired by exposure, and in order to secure the best working quality to cohesive gold it will be found desirable to add pellet after pellet to the freshly condensed surfaces from beginning to completion of the operation.

PLUGGERS.

The choice of pluggers becomes largely a matter of personal selection with most operators, but for these approximal fillings in anterior teeth the forms here illustrated would seem to answer a convenient purpose. Fig. 50 is suggested for starting the filling and locking the gold into the cervical third of the cavity. Its length from the serrated end to the angle is sufficient to reach perfectly to the cervical region of any cavity on an incisor, and the degree of curve is such that direct hand pressure or mallet force may be exerted against the cervical wall. In cavities of large area with ready access much of the filling may be built with it to the point where the incisal angle requires protection, but for small cavities other forms are mostly indicated.

As the incisal angle is reached a plugger of smaller size, and with a greater curve, is required, such as the pair, right and left, illustrated in Fig. 51. Occasionally even these forms will not properly reach the angle on account of the position of the approximating tooth, and where such is the case a small, short right-angle plugger is indicated, Fig. 52. These right-angle pluggers are invariably to be used with hand pressure, and in cases difficult of access the gold may often be "tucked up" into an angle in this way when mallet force is entirely impracticable.

FIG. 50.

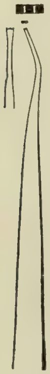


FIG. 51.

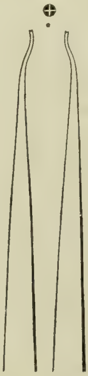


FIG. 52.

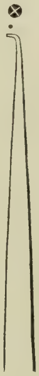


FIG. 53.

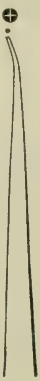


FIG. 54.

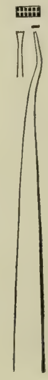
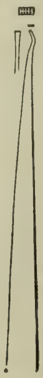


FIG. 55.



For building fillings from the lingual aspect in all cavities of sufficient size Fig. 50 is especially adapted, on account of its adequate reach. In cavities too limited for its use, whether of labial or lingual aspect, the form illustrated in Fig. 53 may be substituted to advantage in conjunction with the curved pair Fig. 51.

One important factor in securing the most stable anchorage of these fillings relates to perfect density of the gold along the angles which join the walls of the cavity. As has previously been stated, accurate adaptation of gold may be obtained to any angle provided the proper form of plugger point is used, and for this purpose such a form as that in Fig. 54 is excellent in those positions where it will approach. Another form suggested for places where Fig. 54 will not reach, and especially for curving under the labial wall and carrying the gold into the angle between the labial and axial walls, is shown in Fig. 55. In cavities where these forms are not available for the angles the curved pluggers with round points may be made to do good service, and secure perfect adaptation by exercising care and malleting step by step along the angle so that the plugger point covers the entire mass of gold with the mallet impact.

For the surface of these fillings, according to their area, pluggers ranging from Fig. 54 up to a small-sized foot plugger may be used to give an even, dense surface.

Finishing Approximal Fillings in Incisors.

When the filling is built to proper form the gold will ordinarily be found to knuckle tightly against the contact point of the approximating tooth, and in finishing the filling the operator must avoid cutting away the gold at this point, and thus producing a flat approximal surface to the filling. The gold should be left rounded out to a contact point, the same as was on the tooth originally before decay began. To this end a narrow finishing strip should be used in the interproximal space to dress the cervical third of the filling to form, and this part of the filling should be finished even with the surface of the tooth before any attempt is made to trim the filling at other points. The strip should not be so wide that in drawing it back and forth between the teeth it will reach to the contact point and cut it down. If the filling is so snug against the approximating tooth that the strip cannot be carried between the teeth, it may be introduced endwise into the interproximal space from the labial aspect.

When the cervical margin is properly trimmed to form, the cervico-lingual portion of the filling may often be dressed down by carrying the cutting surface of the strip—which is still in the interproximal space—as nearly as possible along the lingual surface of the tooth, and the back or smooth side of the strip across the labial surface of the approximating tooth. This brings pressure of the cutting side of the strip to bear immediately on the cervico-lingual part of the filling, and it does not cut at any other point.

After the narrow strip has been used it will often be found convenient to slip on a separator where one has not previously been employed, and force the teeth slightly apart to admit of a finishing strip being carried between the teeth. Where this cannot be done a very thin, broad burnisher, battered out to a uniform thickness and having a sharp edge, after the nature of the Dunn hand matrix, should be forced between the filling and the approximating tooth, and the end of the handle swung back and forth, describing the arc of a circle, while the blade is held between the teeth till there is more or less freedom of movement of the burnisher. This will ordinarily smooth the gold so that a strip may be passed between the teeth.

The strip used for finishing this portion of the filling should be broad, and in manipulating it the cutting surface should be drawn quite sharply across the labial and lingual surfaces of the tooth, so that the filling will be rounded and the labial and lingual aspects dressed even with the cavity margins. In those cases where the lingual surface of the tooth is so concave that the strips will not follow the outline of the cavity, a sand-paper disk in the engine may be used to dress this portion of the filling to form by directing the disk into the concavity with a round-headed burnisher.

After the filling is of the proper form it may be polished with a finishing strip of the finest grit, or thin linen tape may be used, carrying with it fine pumice, followed by whiting. All of this should be done before the removal of the rubber-dam, on account of the protection afforded by the dam to the gums and lips, and also because the saliva interferes with the work.

Whenever strips or disks are used in finishing gold fillings they should invariably be smeared with vaseline, oil, or some similar lubricant to avoid as much as may be the generation of heat in the filling. The lubricant also renders the disk pliable, and it can therefore be directed into depressions with a round-headed instrument—such as a ball burnisher—to much better advantage than where such an attempt is made with a dry disk. This practice will also prove of considerable financial advantage to the dentist if he will preserve his worn-out disks and strips and send them to the refiner. The amount of gold retained on the sanded surface, if lubricated in this way, will in the aggregate yield a surprising profit in the course of a year, and no operator should ignore this kind of economy.

Another aid in the maintenance of a normal temperature in a filling under the friction of a strip or disk may be made available by those who have compressed air at their command. If a jet of air be allowed to play upon the filling during the process of polishing, it will be found to equalize the temperature and render the work more tolerable to the patient.

Approximal Fillings in Anterior Teeth involving the Incisal Angle.

The method of building these fillings is practically the same as that for simple approximal fillings down to the point where the incisal anchorage is made, except that in the contour fillings the open aspect of the cavity renders it possible to more uniformly lay the gold on parallel with the cervical wall and at right angles to the stress of mastication. In these large fillings the approximal surface should be kept sufficiently prominent as the filling is being built from the cervical to the incisal region, to make it unnecessary to add more gold laterally to the approximal surface to complete its contour.

In those cases where the incisal anchorage has been made between the two plates of enamel in the incisal third of the axial wall, the greatest care must be exercised in securing perfect adaptation and density of the gold in this anchorage. Small pieces of gold must be used, and each piece compactly malleted to place with small pluggers. The slightest lack of density or the slightest bridging of the gold at this point must eventually result in a springing away of the incisal portion of the filling which sooner or later leads to its loss.

Where the incisal anchorage is made by cutting a step or groove across the end of the tooth at right angles to the approximal cavity, as suggested in considering cavity preparation, the method of building the filling is to carry the gold down the approximal portion of the cavity level with the base of the step in the ordinary way, and then lay a pellet with its side presented to the floor of the step and its ends looking mesially and distally, reaching from the center of the gold already condensed over into the step. The pellet should be fastened securely to the condensed gold, and then malleted to place in the step. Another pellet should be laid slightly farther along the step, but with one end still lapping the gold already in place. In this way the approximal portion of the filling is securely locked into the step, and the greatest possible strength is given the gold at the point where the approximal joins the incisal portion of the filling by such an arrangement of the pellets. This process of building the gold should be carried on till the end of the step is reached. The entire incisal portion of the filling must be built up with the greatest care, and the arrangement of the pellets, so far as possible, should be in the order already suggested,—the sides at right angles to the force of occlusion, and the ends looking mesially and distally across the step.

The gold should be perfectly annealed and small pellets employed, to the end that the greatest degree of density and resisting power is imparted to the gold. For this portion of the filling it is sometimes desirable to use the heavier golds in strips, such as the No. 60 rolled gold; or in cases where extreme density is desired platinum and gold may be employed. If the rolled gold is used it should not be added till the surface is nearly reached, on account of the greater difficulty of securing perfect adaptation to the labial plate of enamel.

This is one of the most important considerations in building these fillings. Unless the gold is adapted to the labial plate with the greatest accuracy there will eventually occur a leak at this point, which will result in such discoloration as to make the tooth unsightly. The angle between the labial plate and the step should also receive close attention in adapting the gold, so that the filling may be securely seated in place.

For building this portion of the filling pluggers 54 and 55 are admirably adapted, though larger sizes may be used in cases where the area of the cavity will permit it. In teeth long and thin, where the step must be correspondingly deep and narrow and where it has been made to terminate in a depression, for the more secure anchorage of the filling a plugger as small as Fig. 53 may be required to reach the deepest part of the step and bring this portion of the filling level with the rest; but when this is accomplished Figs. 54 and 55 will ordinarily be found none too large to complete the operation. As the surface of the filling is reached the gold should be malleted somewhat beyond the stage where it seems dense, on the theory that repeated blows harden gold and make it more resistant, even after compactness has been reached. In going over the surface for the last time with the mallet a smooth-faced plugger may be used, and the blows so arranged that the final ones are invariably struck along the margins.

For finishing the incisal aspect of these fillings a sand-paper disk, held to position with a ball burnisher, will quickly dress the filling to form, after which it may be polished with a fine cuttle-fish disk.

(To be continued.)

A NEW METHOD OF MUMMIFICATION OF THE PULP.

BY PROFESSOR BOENNECKEN, M.D., D.D.S., PRAGUE, BOHEMIA.

THE following report is a brief abstract of two original communications upon modern methods in the treatment of diseased pulps that have appeared in the *Oesterreichische-Ungarische Vierteljahrsschrift für Zahnheilkunde,* Vienna, January, 1898, and January, 1899. In these papers I have given a report of experiments made by me in the course of the last four years upon the subject of mummifying the pulp after its devitalization by arsenic. Having reached in the beginning of this year a record of a thousand successful cases of acute or chronic pulpitis, all treated in the same way without removing the root portions of the pulp, I venture to give the readers of the DENTAL COSMOS a brief description of my method.

Every practitioner knows that in a great many cases of pulpitis in molars or bicuspids mechanical difficulties will make the total extirpation of the devitalized pulp a matter of impossibility. In another great percentage of cases we cannot remove the pulp, because we dare not inflict the pain upon our patient. Indeed, this little operation is very often a greater torture than the extraction of the tooth itself. I do not know whether American patients can stand a greater amount of pain in the dental chair than European ones, but I can assure you that in our country, and especially in the large capitals of our continent, the dental parlors are full of neurasthenic and hysteric patients who cannot endure the perfect removal of a devitalized molar pulp without paying for it with a few days' suffering from severe nervous prostration.

For this kind of invalids the treatment which I am going to describe seems to me almost a necessity. I may add that busy dentists, especially those colleagues who are engaged in "praxis pauperum," very often cannot find the necessary time for a careful cleaning and filling of the root-canals after the old method that we have been taught in the college. On the other hand, a tooth with fragments of a semi-devitalized pulp left in the canals may be for a certain period of time a source of great annoyance to the bearer. Until the last trace of living pulp-tissue gets perfectly mummified, which may require a couple of months, or even years, the tooth will answer to every cold or hot drink, and will not allow a normal mastication. If, however, the pulp-tissue which has been left in the canals was already infected with bacteria, an apical abscess is certain to appear sooner or later. Therefore, for all cases when we are not either able or willing to perform the total extirpation of the pulp we need some therapeutic agent that will not only perfectly and rapidly devitalize, but also permanently sterilize the fragments of the pulp.

Miller, in his admirable text-book of operative dentistry, recommends little tablets of mercuric chlorid 0.003 gram and thymol 0.005 gram to be crushed by means of an amalgam plugger in the pulp-chamber after the amputation of the crown portion of the pulp. I have tried this method in about a hundred cases, with the result that these teeth, after a short period of pericemental irritation, became perfectly healthy and quiet. The irritation lasted from two hours to three days. Afterward those molars worked like healthy teeth, and never gave any more trouble. The only objection to this method, which is excellent for clinical practice, is the greenish discoloration of the crown; therefore its use ought to be restricted to molar teeth.

For the last four years I have been experimenting in the same direction with different preparations of formaldehyd. Formaldehyd, or formalin in its aqueous solution, has two qualities which make it extremely valuable for our purpose of mummifying the devitalized pulp. It is a powerful sterilizer, and it coagulates the albumen of the living tissue. Indeed, it hardens the protoplasm so quickly that one can change the soft tissue of a pulp into the consistence of leather by half an hour's application of formalin. Therefore, it has of late been widely used for the conservation of anatomical and histological specimens.

The plan of my experiments was to sterilize and to coagulate the root portions of the pulp with formalin; in other words, to harden the pulp like a microscopical specimen, and, as formalin produces little or no shrinking of the tissue, to change the semi-devitalized and infected stumps of the pulp into totally devitalized and aseptic root fillings. I began by washing out the pulp-chamber with the concentrated solution of formaldehyd and sealing in the chamber a piece of cotton wool, saturated with forty per cent. formalin. All the patients treated in this way suffered between half an hour and ten hours from a severe burning toothache. The stage of irritation being once over, the teeth became comfortable, and patients soon forgot that they ever had trouble with them. I discovered that the painful reaction of the semi-devitalized pulp stumps was due to the high concentration of formalin. By gradually diminishing the strength of formalin and mixing the formaldehyd with cocain and thymol to a thick paste, I arrived at a method which I have tested now in more than a thousand cases. I now treat every case of inflammation of the pulp in molars or bicuspids, as follows:

Twenty-four to forty-eight hours after the application of arsenic I remove the crown portion of the pulp (the so-called amputation of the pulp) with a large, sharp bur, using the warm water syringe for cleaning out all the *débris* of the cavity and the pulp-chamber. This little operation is almost in every case quite painless. Then the rubber-dam is applied and the pulp-chamber thoroughly washed out with a ten per cent. solution of formaldehyd (one volume of the forty per cent. formalin to three volumes of water). I call this the "formol-bath" of the pulp. Then I fill the pulp-chamber with my formaldehyd paste, cover with oxyphosphate, and put in the permanent filling. The tooth is always finished in one sitting.

Two years ago I published the following formula for the formaldehyd paste:

℞—Cocain,
Thymoli, āā 1, 0;
Misce exactissime terendo.
Adde sol. formaldehydi aquos (40%), gtt. x;
Zinc oxid, 2, 0.
Fiat pasta.

But a formaldehyd paste exposed to air in an open bottle does not answer very well. The formaldehyd soon evaporates and disintegrates; besides, the paste soon loses the proper consistence,—it is either too thick or too thin to be handy for dental purposes. Therefore, I gave an order to Mr. van Tongel, an eminent chemist of Prague, to prepare this paste with a very high concentration of formaldehyd, give it the proper consistence, and fill it in small tin tubes which can be hermetically closed. These tubes I gave to the depots to be sold at the usual cost of making. The large percentage of thymol is given to the paste to insure the permanent sterilization of the pulp fragments. A series of experiments upon pulps of different animals has shown that thymol penetrates the tissue of the pulp very slowly,—viz, in the course of several weeks,—from one end to the other, and that it retains its antiseptic power, as it seems, for an unlimited time. The formalin, with its rapid action, may soon evaporate and disappear, whereas thymol will stay and be a reliable antiseptic agent. A small piece of the paste is pressed out of the tube, brought into the pulp-chamber with an amalgam plugger, and pressed gently against the root stumps of the pulp with a piece of clean cotton wool. The whole operation is done in five minutes; there is no pain inflicted on the patient, and, as far as my four years' experience goes, the tooth will give perfect rest. When the patient comes back to you the next day, or later, the tooth will not show any sensitiveness upon tapping with a steel instrument, a symptom which is nearly always observed after cleaning out the canals and filling the roots. If the inflammation of the pulp has been associated with a slight pericementitis (the so-called pulpoperiostitis), the pericemental irritation will disappear the day after the application of the formaldehyd paste.

After this method many thousands of cases were successfully treated last year in Germany and Austria, and I feel now so sure of success that whenever a failure in this treatment occurs in my clinic—maybe a patient comes back with pain and pericementitis—I say to my students there has been made a mistake in the diagnosis. Of course, all cases of decomposed pulp, likewise all cases of destruction of the pulp-tissue by pus-formation, have decidedly to be excluded from this treatment. In these cases the canals have to be cleaned out and filled with antiseptics.

For the treatment of septic cases I have recommended for the last two years to my students and to my German colleagues the sulfuric acid process of Dr. Callahan, of Cincinnati. I consider this method the greatest progress that has ever been made in the treatment of gangræna pulpæ. After a few applications of the acid the calcific depositions, which we find in almost every case of diseased pulp blocking the root-canals, are decalcified; the canals get wide, and their sterilization has become an easy thing. Neutralization is done with bicarbonate of sodium, or, better, with peroxid of sodium. When the canals are clean I fill them with the formaldehyd paste above described. Mix a little piece of the paste with a drop of the ten per cent. solution of formaldehyd, and fill the canal with this thin cream. The disinfecting power of the formaldehyd gas that is developing after the introduction of the paste is surpassed, according to my experience, by no other antiseptic agent. I always order the patient to come to a second sitting, though as a rule the canals are sterilized after the first treatment. Very rarely a third sitting is required.

The formaldehyd paste remains in all septic cases as a definitive filling in the canals. It seems to me necessary to fill the roots in septic cases with a soft paste that will never get hard, so that if the tooth should give trouble later on you may any moment enter the canals again with your nerve instrument. And for this purpose the formaldehyd paste seems to be an ideal material.

THE TREATMENT OF CAVITIES PREVIOUS TO FILLING, IN RELATION TO MODERN PROGRESS.

BY R. H. HOFHEINZ, D.D.S., ROCHESTER, N. Y.

(Read before the Eighth District Dental Society of the State of New York.)

In the filling of any tooth there are two factors that present themselves in bold relief to both the operator and the patient who is operated upon. First, how painlessly can this operation be performed? Second, will the operation be permanent?

Is there any man within reach of my voice who has not an individual remedy for sensitive teeth, be it, as Dr. French calls all remedies when asked by his patients, ubisissi or cataphoresis? Is there any one whose remedy has proven an infallible application in all cases? I fear that we have not approached the millennium any closer within the last three years than we did previous to that time. Some of you may say, He has never tried cataphoresis fairly. I answer emphatically, I have. I have tried it, in ignorance first, and succeeded in killing numerous pulps, and thus had no susceptibility to pain. I overcame this kindergarten epoch, tried it with intelligence and care, and found it the same unreliable remedy that all others were which are at our command. I have succeeded in destroying numerous pulps, with all the care that my modest skill and intelligence could exercise. If a pulp dies on application of a ten per cent. solution of cocain hydrochlorate, in connection with a ten-volt and one-tenth of one milliampere electric current, there must be the same unsatisfactory difference in the individual susceptibility to the electric current that exists in the use of medicinal agents. In applying an electric current to any live organ of the body we must reckon with the same subjective conditions, with the same idiosyncrasies, that we have to fight with in the application of any medicinal agent. The result remains questionable.

In corresponding with my friend, Dr. C. K. Van Vleck, of Hudson, N. Y., I received, on November 15, the following suggestion: "Send at once for a bottle of vapocaine. It is the greatest obtunder for sensitive dentin. After applying it for one minute you can excavate any cavity, whilst the patient laughs; it was indorsed by the New York Odontological Society at its last meeting." I at once telegraphed for the preparation, which arrived on a Sunday morning. I came to my office on Monday morning, later than usual, feeling that I had a conqueror in my pocket which would shorten the operations of that day and of all days to come. I had an extremely sensitive tooth to fill, first molar, distal cavity, filled three weeks previously with a temporary filling which, to suit the case, had come out a few days before the appointment and left the cavity in a very sensitive condition. I applied the vapocaine, which is a fifteen per cent. ethereal solution of cocain hydrochlorid, with an air of supreme certainty of success. The patient was an unusually heroic one. Directly on application the tears began to trickle down her cheeks. With King Lear, I said, "Are your tears wet?" She answered, "God bless your majesty, they are." This was my new disappointment in the use of this laudable remedy. I have used it in every case during the past week, and found, first, frequently extreme pain on application, owing undoubtedly to the production of the intense cold of the ether; second, followed by a moderate and sometimes complete reduction of sensitiveness.

I do not call this a success. A successful remedy for the use of overcoming sensitive dentin must overcome all sensation to excavation, and must be harmless to the pulp in its after-effects. I claim that that remedy is not found, and I question whether the new remedies have brought us nearer to the millennium than the old ones, among which I place, first of all, zinc chlorid. The danger it exerts, when in close proximity to the pulp, can be counteracted by a carbolization of the cavity and a thorough irrigation, after its use, with tepid water. I must leave this question with the same deep sigh for future relief with which I approach the second one: viz,—

Will the operation be permanent?

It is not my purpose to speak of imperfect manipulations; not my purpose to speak of the many defective fillings which are daily inserted, owing either to the lack of skill of the operator or lack of chance to do a perfect piece of work. I will not enter into the question of filling-materials, my view being, and remaining until the muscles of my back will dictate a change of tactics, that gold, in the hand of the skillful, is the filling *par excellence* in the majority of cavities, though used frequently also in combination with other materials. I refer only to the recurrence of decay under or around a physically perfect filling.

To what degree has the law of antisepsis assisted us in preventing the recurrence of decay? First of all, we often hear the unscientific remark made, "This filling has antiseptic value upon the tooth." We all have our pet views. Some years ago I read a paper on "Medicated Cement Fillings," attributing to them the antiseptic influence of the incorporated agent, and I still adhere to the theory that cements thus treated have a positive antiseptic value for a time. Why does tin in combination with gold preserve the cervical wall of approximal cavities better than any material known to us? Is it only the physical superiority it possesses over gold, or is it also its chemical character? I have removed such fillings and found the physical character of the tin totally changed, and yet the tooth-wall free from all decay. If it had been the physical property only, it would have lost its influence with its deterioration. The stannous oxid must have been a factor in preserving this tooth. Yet Miller, in his researches, tells us that the only filling which has a permanent antiseptic value is copper amalgam, the very material we do not use or do not know how to make in this country.

To determine the antiseptic value of a filling-material, Miller infected tubes of ordinary nutritive gelatin with bacteria from the oral cavity. Most of the materials have been tested. Gold amalgam, when fresh, has a slightly retarding effect; twenty-four hours later none. Oxychlorid of zinc has a marked effect; twenty-four hours after none. Oxyphosphate a very slight effect; gutta-percha and tin no effect whatever. The results from gold are extremely peculiar. Pack's pellets show the greatest retarding influence. The antiseptic value of gold, according to these researches, is completely destroyed by annealing. Powdered sulfate of copper, when incorporated with cement or strewn upon the bottom of the cavity before inserting the filling, also showed no traces of development. This, together with copper amalgam, has proven the only positively antiseptic filling-material. Not any other material has a sufficiently long antiseptic influence to prevent the process of fermentation around its borders.

Different, however, it is when we apply the law of antisepsis to the dentin previous to the insertion of any filling, even where a layer of decomposed dentin has been left in the cavity, and we can consider the prophylaxis of a cavity as well as that of the mouth. I will not speak of the antiseptic treatment of the ordinary cavity. Previous to our knowledge of antisepsis we looked upon the remnant of decomposed dentin as dangerous, excepting the operator adhered to the happy idea that decomposition was impossible without oxygen. The teachings of Miller have acquainted us with aërobic and anaërobic microbes, and we are too well aware of their proliferation, even with the exclusion of oxygen. There is no doubt in my mind that I have succeeded in thoroughly sterilizing such soft layers. Remember, please, that they must never be near the margin of the cavity. The only place where I would tolerate them is in the bottom of the cavity, as an alternative to the exposure of the pulps. My method is, first, a thorough dehydration with bibulous paper, chloroform, and warm air; second, bicarbonate of soda to remove the acidity usually existing in decayed dentin; third, dehydrating again; fourth, use of antiseptic concentrated carbolic acid, trichloracetic acid, ten per cent. solution of formaldehyd. Keep layer of decomposed dentin thoroughly saturated, then fill temporarily with an oxysulfate filling. Repeat the antiseptic part of the treatment after twenty-four to forty-eight hours; then fill by putting a layer of medicated cement —my preference recently having been for thymol—on top of the decomposed layer; gutta-percha as an interposing material, then oxyphosphate, and completed by metallic filling.

This is one of the few cases where the law of antisepsis has given us positive aid in preventing the recurrence of decay. What it has done for us in treating pulp-canals is not under consideration.

Dr. A. C. Hart, in a paper read in Chicago, speaks of making dentin immune against decay by the use of formalin. We must await additional testimony and experimentation before we can accept all the possibilities claimed for this process. In the mean time I beg to caution my friends as to the use of the forty per cent. solutions of paraldehyd. I have met, in three instances of approximal decay, rubber-dam properly applied, with a transfusion of the substance through the silk ligatures, which in one instance almost terminated fatally to the second bicuspids.

The use of the tincture of chlorid of iron had the same beneficial effect upon the affected parts that it has in arsenical poisoning.

There is one remedy in our possession to-day for which we can claim the production of immunity to a circumscribed degree,—silver nitrate. You all know its limitations. The law of antisepsis which has done such wonderful things in surgery has aided us but little in this direction.

A large, well-shaped, self-cleansing, properly knuckled gold filling is the only means that will permanently preserve the approximal part of a tooth, in spite of 1-1000 mercury bichlorid and the minor antiseptics.

Our profession is still awaiting the final dictum on pyorrhea alveolaris, erosion, treatment of sensitive dentin, and the immunity of dentin against decay.

AN INDESTRUCTIBLE PIN CROWN.

BY DR. F. R. SANDUSKY, NASHVILLE, TENN.

In cases of direct occlusion of the teeth (especially in the mouths of men well advanced in years) it is a difficult matter to insert porcelain for either single crowns or for abutments for bridge-work that will meet the necessary resistance of occlusion without causing fracture of the porcelain, and in trying to obviate the usual result attending such practice I have recently constructed for these cases an indestructible pin crown, which may be used with much satisfaction for single crowning or for abutments. I am as bitterly opposed to the insertion of all-gold crowns in the anterior part of the mouth as any dentist could possibly be, but when we have cases presented to us for treatment requiring a crowning operation it is at least a pleasure to know that you are able to construct a bridge or crown which, although unsightly, is serviceable. *Under no consideration* would I place in the anterior part of the mouth of a lady patient an all-gold crown of any description, even though urged to do so, knowing, as most other dentists know, that requests for that kind of work seldom, if ever, come from ladies of extreme refinement. In fact, I never knew of a case where it was demanded by patients constituting a high-class practice, for they are always willing to place themselves entirely in the care of their dentist, and if such a blunder is made it must necessarily be the fault of the dentist, not the patient.

The crown I suggest is very eminently adapted to use in cases of old gentlemen whose teeth are slightly or greatly worn from force of mastication in *direct occlusion.* The indestructible pin crown came to my mind as a necessity for an abutment in a bridge in the mouth of a patient whose case offered this difficulty to overcome.

The case was not only direct occlusion, but in addition there was a sliding or slightly lateral pressure brought to bear. When the jaws came together and as often as porcelain was used, just that often I had to reconstruct the bridge. The root of the upper right cuspid, acting as the anterior abutment of the bridge, had previously supported a Richmond crown, and as it had been carefully shaped in the first operation it offered an especially good foundation for my all-gold pin crown. A band-cap and pin was made exactly as for a Richmond crown, the cap band and pin being soldered and dressed down was placed in position on the stump, bite and impression obtained in modelling composition, and the upper part of model run in sand and plaster (sand one part, plaster three parts). After separating, a small piece of modelling composition heated in dry heat was placed on the cap, the exact position formerly occupied by the porcelain facing, and by bringing the two halves of the crown articulator together an accurate position of the opposing lower teeth was obtained; holding the articulator in this position, I carved the labial, mesial, and distal surfaces exactly to represent the original tooth, after which it was carefully removed and an impression of it taken in Melotte's moldine, a die of Melotte's metal run, and from a piece of 22-carat 32-gauge gold plate swaged a *hollow gold facing* which, when placed in position on the model, fitted accurately every part, as did the compound after carving. The *gold facing* was then waxed into position on the model, invested and contoured on its palatal surface with 20-carat solder, finished and placed in position. An impression for the bridge (extending to the second molar, it having previously been fitted with a gold crown) was constructed in the usual manner of using solid dummies. Since using this pin crown in this case I have made use of it in a number of cases, and in each instance have been rewarded with the same result, that of entire satisfaction both to myself and the wearer. I have never read of a similar crown in any text-book or journal, nor have I ever seen it demonstrated. I therefore take pleasure in submitting it, knowing from personal experience that it is not only much more sightly than the average gold cuspid crown made with contouring pliers and other devices, but by its use it is easy to overcome in crown- or bridge-work the difficulties encountered in cases of direct occlusion.

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PROCEEDINGS OF SOCIETIES.

THIRTIETH ANNUAL CONVENTION OF THE SIXTH, SEVENTH, AND EIGHTH DISTRICT DENTAL SOCIETIES OF THE STATE OF NEW YORK.

(Concluded from page 287.)

THIRD DAY—*Morning Session.*

THE convention was called to order at ten o'clock, and Dr. C. W. McCALL read the following paper:

A REVIEW OF PYORRHEA ALVEOLARIS.

While at the present time this disease has the distinction of being fashionable, it has also without doubt an aristocratic and uninterrupted descent from the most ancient times. We have only to look at the skulls of ancient races of men on exhibition in the large museums of the country to satisfy ourselves that this disease is "no chicken," but rather an old patriarch compared with whom many of our present ailments are as infants.

The indisputable evidence of its great antiquity is hard to reconcile with some of the theories as to its etiology, for primeval man had few of the dental luxuries to which we have traced the starting of pyorrhea. Of course, he may have gone wrong when he used a thorn or fish-bone toothpick, and perchance broke it off between his molars. But he had pure water and pure air in abundance, with plenty of out-of-door exercise, and it seems fair to suppose that his diet was not conducive to malassimilation. But he had Riggs's disease in spite of himself.

Hippocrates, who lived and wrote three hundred and fifty years before Christ, and was the first great physician, devotes some space in his writings to his observations of the human teeth. He must have seen pyorrhea alveolaris, for he recommends that all rotten and *loose* teeth be removed.

Pierre Fouchard and Jourdain described this disease in 1746, but considered it incurable, and advised early extraction.

In 1757 Bourdet made the first efforts to save teeth thus affected. He made an incision above the tooth affected and cauterized the denuded portions, and then let nature take her course.

Passing down to the present century we find among some of our earlier dental literature references to this condition, but the treatment prescribed is empiric and often absurd. Even as late as 1843 Maury, in his "Treatise on the Dental Art," says that the disease is subdued by emollient and narcotic gargles, by the application of leeches above the angles of the jaws, and by foot baths. No reference is made to calcareous deposits, nor to their removal. Contemporary with this, however, Drs. Fitch and Harris recommended as a mouth-wash in this disease a decoction of the inner bark of green white oak.

About 1850 M. Marchal de Calvi gave the name of expulsive gingivitis to this condition, and treated it with a watery solution of iodin; he used no surgical treatment whatever.

Early in the 50's Dr. J. M. Riggs had made a special study of this disease, and was treating it successfully. During the subsequent twenty-five years many of the leading practitioners treated this condition with varying success, but his contemporaries, with few exceptions, gave him precedence for the highest skill attained, and their many allusions to his methods and success gave birth to the name Riggs's disease.

As is well known, his treatment was entirely of a surgical character, and he used no medicaments excepting myrrh. If there was anything remarkable in his surgical treatment besides his thoroughness it was that, besides removing all concretions, he cut away the diseased edge of the alveolus back to the healthy parts. The instruments, six in number, which he designed and used so skillfully were adopted by many of his contemporaries, some of whom journeyed to Hartford for the privilege of watching him operate.

Dr. Magitot, of France, in 1867 cauterized the gingival pockets, after removing the tartar, with pure chromic acid. Besides this, he recommended chlorate of potash tablets, scarification of the gums, leeches, and finally purgative mineral water for the general health.

Prominent among the early disciples of Dr. Riggs was Dr. Geo. A. Mills, of Baltimore, who wrote a very instructive series of articles, appearing in the DENTAL COSMOS during 1877 and 1878, in which he explained the various stages of the disease, its effects on the general health, as well as some features not mentioned before. He here described clearly the method of operating with Dr. Riggs's instruments and his own method of polishing the necks of teeth with tape. After removing deposits he used aromatic sulfuric acid, instructing his patients to use lukewarm salt water every day, and tincture of myrrh to relieve tenderness.

In 1877 Dr. Rehwinkel read a paper before the American Dental Association on this condition, in which he claimed that constitutional and hereditary causes were concerned in the production of this trouble. He then suggested the name pyorrhea alveolaris, which seems to have been the popular title for this disease down to the present time, though the term was used by the French some years prior to this.

In 1878 Dr. G. C. Davis believed that a solution of the problem was to be found in low vitality and feeble vascularity. Professor Chas. J. Essig wrote a paper on this subject in 1879, recommending the use of an aqueous solution of chlorid of zinc after all deposits had been removed; and in 1880 Dr. Edward S. Niles advocated the surgical methods of Dr. Riggs, used aromatic sulfuric acid, and as a solvent for the calcareous deposit used a two and a half per cent. solution of hydrochloric acid.

In 1881 Drs. Witzel, Arkövy, and Black took the view that pyorrhea alveolaris is a specific infectious disease, basing their claims on the fact that the seat of the lesion is filled with micro-organisms. The next year Dr. L. C. Ingersoll advanced the theory that sanguinary calculus was the origin of the trouble, and that it is impossible for salivary calculus to be deposited at the apices of roots, but that the calcium salts which are in solution in the blood are carried directly through the capillaries and deposited there.

In a paper read by Dr. A. W. Harlan, in 1883, he describes a successful result in which he applied an aqueous solution of iodid of zinc, after first removing concretions. In acute pyorrhea he saved the patient much pain by packing pockets with iodoform and eucalyptus and syringing with aqueous solution of chlorid of alumina, and finally with peroxid of hydrogen. In 1884 Dr. J. D. Patterson expresses his belief that pyorrhea alveolaris is a catarrhal condition, his arguments being the similarity of its symptoms with those of catarrh and its co-existence with that disease. The next year Dr. A. O. Rawls attributed this pathological expression to mercurial taint and to the effects of chlorid of sodium.

In the Dental Cosmos for November, 1886, an article appears, written by Dr. Talbot, giving a brief *résumé* of opinions held by the more prominent operators who had treated this disease from Dr. Riggs to that time. His own opinion, briefly expressed, was that the predisposing cause was a perverted condition of the secretions, low vitality, and sanguinary calculus; that the local causes were catarrh, salivary calculus, and irritation from foreign substances,—in a word, whatever irritated the peridental membrane.

In July, 1800, there appears an article in the Dental Cosmos by Dr. Chas. B. Atkinson, where he claims that the most frequent antecedents are gastric dyspepsia and nasal catarrh. He also gives an elaborate system of retaining appliances and medication. Dr. John Marshall in 1891 offered as a title for this disease the term rheumatic and gouty pericementitis, while Professor E. T. Darby was satisfied with the terse name of gouty pericementitis.

In a very able paper read before the State Society in 1893 by Professor Barrett, and in which he made many valuable suggestions, he described three different phases of this disease, to which he gave the names gingival pyorrhea, nodular pyorrhea, and cachectic pyorrhea. In this same year Dr. Edward C. Kirk began using trichloracetic acid for softening the concretions on roots of teeth, afterward using it in connection with pyrozone. About the same time Dr. Ottolengui began using pyrozone as an agent to cleanse the pockets of pus, but claimed to have no success with trichloracetic acid as a solvent of concretions.

This was the year also in which Professor C. N. Peirce made the startling announcement that he had found uric acid and its salts at the apical ends of roots in typical pyorrhea alveolaris. His analyses were both microscopical and chemical, and the results confirmed his theory as to its being a manifestation of the gouty diathesis. His treatment consisted in placing his patients on an albuminous diet, with Hunyadi water or tablets of lithium citrate. In 1894 Dr. Sigel Roush, of Washington, finds electricity of value in exciting healthy condition of the tissues involved in this affection, his method being to use a two-cell battery with one pole provided with a needle similar to those used by the dermatologist in destroying hair-follicles.

In May, 1894, Dr. W. Xavier Sudduth, in an elaborate paper read before the Minneapolis Dental Society, opposes the uric acid theory of Dr. Peirce, and in September of the same year Dr. Younger, of California, combats the theory of constitutional origin, especially in its alleged development from gouty diathesis. With an experience of over thirty years, he still thinks it to be of local origin, and due to a diseased activity of the pericementum, caused by disturbed nutrition or local irritation. Dr. Bonwill agrees with Dr. Younger, but goes a step further and uses carbolic acid, pure and not diluted. He believes that if anything helps out these cases it is proper articulation of the teeth and cleanliness. In August, 1895, Dr. M. L. Rhein, in a paper read before the State Society, explains the modern treatment of pyorrhea alveolaris. The method of procedure in the division he has designated pyorrhea complex requires the greatest skill, the most exhaustive examinations, including urinary examinations, which must sometimes be repeated over and over again. In this division he expects to find an excess of uric acid, and considers the bitartrate of lithia introduced to the profession by Dr. Kirk of the greatest benefit in restoring to a normal condition. He also directs most careful attention to diet and exercise, with ample supply of pure water.

In a paper written by Dr. Talbot in 1896 he maintains that the uric acid theory of Dr. Peirce is not in harmony with the results shown by chemical tests made in two well-known medical laboratories, reports of which he shows. In the same year Dr. Van Woert, in a clinic, successfully anesthetized the soft tissues for an operation in pyorrhea alveolaris by the aid of cataphoresis.

An article from the pen of Dr. Hugenschmidt, of Paris, appears in 1896, in which he gives a most interesting *résumé* of much that has been written on pyorrhea, and, in addition, his own treatment, which consists mainly in first curetting the pathological peridental space, removing tartar and infected alveolar crest; secondly, in cauterizing the gum-pockets with pure sulfuric acid; third, consecutive treatment, consisting in strict care of the teeth, massage of the gums twice a day, and continuous use of antiseptic mouth-baths.

In October, 1897, Dr. Talbot again gives us an article on this disease, repeating his theory that it results from simple inflammation of the gums, which afterward becomes chronic, involving the pericemental membrane. He gives his patients quantities of fresh spring water, and concludes that the deposits result from pathologic and chemical changes which take place in the tissues themselves, and are a consequence, not a cause.

Dr. Payne washes out pockets with boiled water warm, introduces into pocket a drop or two of five per cent. solution of pyrozone; after drying out socket he places in it two or three drops of concentrated solution of lactic acid. Before removing calculus he treats and fills all pulpless teeth thus affected, fastening the very loose ones with sprints of silk twist; and in removing calculus he places in bottom of pockets with blunt-pointed, curved needle a two per cent. solution of cocain, with one-third glycerol and a few drops of iodin; this he claims makes that operation almost painless.

In January, February, and March, 1897, *Items of Interest* appears a series of articles by Dr. Theodore Gramm. He claims that in pyorrhea alveolaris we are confronted largely by systemic malconditions. In considering the genesis of this disease he suggests four primary causes, each of which he subdivides and describes. After removing deposits he irrigates pockets with germicidal solution, then establishes firm support of loosened teeth, finally advising his patients to drink large, free potations of pure water. Dr. B. F. Arrington, in December *Items*, claims that to treat pyorrhea constitutionally is a waste of time. Thinks it is disassociated from other diseases of the gums and alveolar process, and is not dependent for origin upon local injuries to the gums, and never the effect of a remote cause. He medicates with sulfuric acid, camphophenique, and carbolic acid. Usually effects a cure in ten days, and, if his instructions are followed as to use of tooth-brush and finger pressure, the disease seldom returns.

Dr. J. N. Farrar uses Davidson spray tubes operated with compressed air. Filled with the medicament, a copious spray lifts away the gum tissues and forces away all foreign particles.

In the DENTAL COSMOS for December, 1897, there appears an article by Ernest Sturridge, of England, advocating cataphoresis in the application of medicaments in pyorrhea. He says whatever medicines give satisfaction in the treatment of pyorrhea alveolaris without the aid of cataphoresis will give far greater satisfaction with it. Powerful medicines should not be used, but, the object being to destroy all germs and stimulate broken-down tissues to repair, cataphoresis supplies a means which is exactly what is needed.

In the DENTAL COSMOS for January, 1898, there appears an article by Dr. Henry H. Burchard, entitled "Varieties of Dental Calculi," a perusal of which throws much light on the concretions which figure in pyorrhea. He describes five varieties, which are fully illustrated. March *Items of Interest* contains a practical paper by Dr. G. V. I. Brown. He prefers lactic acid as solvent for deposits, and believes, with Dr. Bonwill, that malocclusion is an active source of irritation in ninety per cent. of all cases. Dr. Gordon White also uses the lactic acid treatment of Dr. Younger, and where roots are very sensitive uses lactate of silver in saturated solution and ties loose teeth with silk ligatures.

Dr. G. H. Thompson uses trichloracetic acid on an orange-wood stick to facilitate removal of deposits. Where pus is present, washes out with pyrozone. Believes in systemic treatment, and urinary examinations often repeated. Dr. M. L. Rhein believes that deposits exist near or on the end of the root when the gingival border has not been involved. At a meeting of the Odontological Society of New York in March, Dr. A. W. Harlan read a practical paper, giving his views on this disease. He claimed that in the mountains, where dampness does not exist and microbes do not thrive, the varieties of looseness of teeth are not the same that we see on the borders of a great lake or in the lowlands, where miasms flourish and people suffer from intermittent fevers and rheumatism. In cosmopolitan cities we must seek for different causes, largely influenced by hereditary tendencies. Thinks that perhaps diseases like typhoid and catarrhal inflammations of mucous membrane sometimes furnish suitable fields for cocci which invade the territory around the neck of the tooth. Does not believe that gout or rheumatism can be regarded as potent factors in this disease. Believes that abnormal mouth-breathing is a factor, and that heredity plays an important part. As a retaining appliance he uses silver wire, which has the two-fold use of holding the loose teeth in place and of exerting a therapeutic effect of destroying pus-producing bacteria. In the discussion that followed the reading of this paper Dr. O. E. Hill stated that sulfuric acid and wine of opium were his chief reliances. Dr. Jarvie removed concretions with trichloracetic or sulfuric acid. Dr. Rhein agreed with Dr. Harlan in washing out pockets with solution of mercury bichlorid in hydrogen peroxid. Does not consider the addition of tartaric acid necessary, as the sublimate deposit may be avoided by using Marchand's hydrogen peroxid. Also believes in wiring the loose teeth with pure silver wire. In the September DENTAL COSMOS Dr. G. T. Carpenter gives his method of handling this disease, and, among other things, he dries out the pockets with bibulous paper in making his examinations and protects the parts with a napkin. He then coats surrounding gum with cosmoline for protection against action of medicines; packs the pockets with cotton moistened with cocain, and after a few minutes cotton is removed, when pockets can be examined thoroughly. Uses spoon-shaped excavators, cleanses pockets with equal parts of peroxid of hydrogen and pasteurine, and finally paints gums with tincture iodin twice a week.

In conclusion, with all this diversity of opinion, with theories so diversely opposite, what guide is there for the novice in the treatment of this disease?

Discussion.

Dr. W. A. BARROWS regretted that Dr. McCall had not given his own views on the etiology and treatment of pyorrhea. The subject of pyorrhea receives constant attention from dentists, and is discussed more at dental meetings than any other subject; but still the nature of the disease and the course of treatment are matters upon which there is wide difference of opinion. This paper gives a *résumé* of most of the theories which have been advanced. An impressive array of prominent men are quoted in the paper, such as Harlan, Kirk, Peirce, Rhein, Van Woert, and others, to whom we look up; and it is remarkable how much they differ. Some think the disease is purely local in its cause, and some systemic, while others think it both local and systemic; and the range of treatment varies from the purely local and surgical to the systemic treatment by internal medication. Personally, he believed that the disease could be cured and was cured, but that many cases which were supposed to be cured were sure to return within a year or two. His method is to remove from the teeth, as perfectly as possible, all deposits; then use the hydrogen peroxid of the Oakland Chemical Company, as it has no excess of acid, to cleanse the pocket thoroughly. In a week the patient returns, and if the progress of the cure is not satisfactory he prescribes lithia tablets and massage. Should the trouble not recur within a year he considers the cure complete; if it recurs he considers the case incurable. He believes that many cases will prove incurable under the best treatment present knowledge affords, but hopes that the time will come when we can handle this disease with more certainty.

Dr. Henry H. Tompkins, of Utica. The paper which has just been presented is in many respects a very commendable one. As has been suggested, it would have pleased us all I am sure had the essayist given us the result of his personal experience.

I shall not stop to discuss the etymology of terms. We all know what is meant by pyorrhea alveolaris, and the name, whether good or bad, will in all probability cling to the disease as long as the disease clings to man.

After listening to a paper of this kind we naturally come around to the same old question, When a case next presents itself in our office, what are we going to do about it? The little experience I have had leads me to the conclusion that it is beyond the power of man to cure all patients, and that a certain degree of judgment must be exercised in the selection of cases.

If the patient be one in whom the forces of life are waning, or one who does not have, or cannot be made to have a proper sense of the gravity of the situation, and will not to a certain extent aid us by a change in his mode of living, we may just as well drop both hands and say, "Good-by teeth." If, on the other hand, we can have the full co-operation of the patient, and with systemic remedies, proper food and exercise, he can be placed upon the upward instead of the downward path, a great deal can be done for him and permanent good realized.

This paper, like a great many others, directs us as a first consideration to thoroughly remove all deposits. Yes, but how? A very easy thing to say, but a most difficult one to accomplish. In the whole realm of dental operations I know of nothing which will so thoroughly tax the skill, ability, and integrity of an operator as this one task of thoroughly removing *all* deposits from *all* the teeth.

In work of this kind the matter of instruments plays a very important part, although it is one which is seldom alluded to in the discussion of the topic. As a first requisite it is absolutely essential that each and every instrument used for the removal of deposits beneath the gum should be a hook or pull instrument. Absolute cleanliness is the keynote to the situation, and it will be readily seen that every time we dislodge deep-seated deposits with a push instrument more or less of the *débris* is liable to *remain* there as a source of irritation and a nucleus for further infection, even though we attempt to float it out by subsequently syringing the pocket. The vital importance of this suggestion was pointed out to me by Dr. Many, of Norwalk, Conn. And it is quite possible that the failure of many operators to successfully cope with this disease consists in the fact of their not having fully recognized this principle.

It would seem that the large majority of this class of instruments upon the market to-day are clumsy and inadequate. As an illustration I have placed here upon the blackboard a draft of a Sheffield scaler (Fig. 1).

FIG. 1.

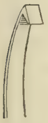


FIG. 2.

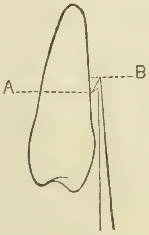


FIG. 3.

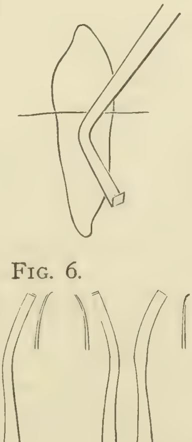


FIG. 4.

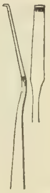


FIG. 5.

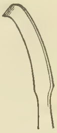
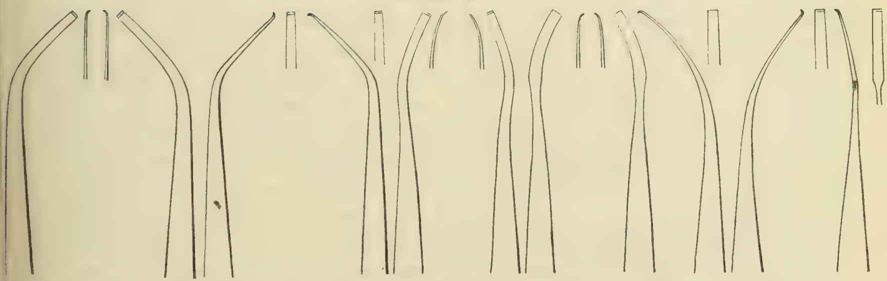


FIG. 6.



If you please, look at those sharp corners. It will not take a vivid imagination to see that it is an extremely cruel instrument to push into the sensitive tissues surrounding a root.

Next, as it is placed against the root to remove a deposit at A, Fig. 2, the point of the instrument must necessarily be pushed to B, where it strikes healthy process and can go no farther. How are we going to clean the intervening space? We simply can't do it. The same is true of the King scaler; and the blade is too heavy, and is not made at a proper angle, for as we pass the handle over the front teeth and attempt to follow the root down it follows just about like that (Fig. 3).

The instrument which comes the nearest to an ideal point of any with which I am familiar is the Allport No. 4 (Fig. 4). However, this, in a much smaller degree, is open to the same objection, and furthermore it is not aggressive enough in its action.

I have therefore devised this form (Fig. 5), which is just as near a push instrument as can be made and still retain the working qualities of a hook; and the character of the point is such that it will pass to the *extreme* base of a pus pocket without further destroying healthy tissue; will take a positive hold, and with careful manipulation bring out everything before it.

At our meeting in Syracuse I exhibited a set of twenty-two instruments, which I had made from time to time.

Here are shown drafts of eleven (Fig. 6), which were selected at the request of several present as being the most useful, and none of which I feel that I can do without in my own practice. They are not catalogued, but a few sets were made by The S. S. White Company, and the letters which have since been received testify to their efficiency and the comfort of the operators using them. Of course, hooks have been used for the removal of deposits since the year one. But this is not only a hook, but it is a moderately sharp hook; and placed at such an angle that as the blade is sprung under manipulation it goes absolutely to the extreme limit to which the disease extends, and does not leave space beyond the point which cannot be cleaned. It will be seen at a glance that most of the blades are simply modifications of standard patterns. But, to my mind, in that modification, and a point of this specific form adjusted to each, is all the difference between a useful and a useless instrument,—the difference between success and failure.

In connection with this may be used trichloracetic acid, full strength. This remedy not only acts as a solvent, but its judicious use causes a slight sloughing, which seems to be particularly stimulating, and healthy granulations soon spring from the gum-tissue.

By far too many operators take hold of this trouble in a half-hearted, discouraged way. The same instruments and the same remedies in different hands will produce very different results, and in order to be successful one must take hold of the work before him with firmness and determination. Place a small quantity of the acid, say one or two drops, in a convenient receptacle; dip the extreme point of the instrument in it, carry it to the base of the trouble, and repeat as may be necessary. Take one tooth at a time and clean it clean, no matter if it takes one hour or forty, and syringe the pocket with any medicament you think wise; and then don't touch that tooth again,—it being understood, of course, that a proper mouth-wash or spray has been prescribed and its use insisted on.

It will, I believe, be found that there are hundreds of cases which, if dealt with in this manner, will come back to us in a short time with the tissue as bright and clean as a child's.

Is the case cured? It is generally accepted that the cause of this trouble is not a local one. Like causes produce like results, and just in proportion as we are able to modify the patient's habit of life will the work be permanent. It will probably be necessary to watch most cases carefully, and occasionally touch a place here and there. But the grand fight has been made, and the question as to whether those teeth are to be lost or saved definitely settled.

The following paper by Dr. FRANK L. SIBLEY, of Rochester, was read by title:

PYORRHEA.

It is with no apology that I present the subject of pyorrhea alveolaris for your consideration at this time, for within the boundary of dental pathology I know of no disease that has so baffled dental science as this. It held sway in the court of Pharaoh, and has occurred in the human family with unceasing regularity since that time. In support of this statement I can say that I saw the jaws of an Egyptian mummy that bore the unmistakable evidences of the ravages of this disease. It is non-sectarian and cosmopolitan in the extreme, for its withering hand is felt from the prince of royal blood to the lowliest peasant; so, if an apology is due, it would come with better grace from our profession to the civilized people of the world.

It seems almost incredible, in view of the numerous perplexing and complicated questions that have been met and settled by our progressive profession, that this should have been marked by the "powers that be" as the one obstruction in the onward march of dental science. Yet to my mind the day is far distant when we can boast of a complete cure of pyorrhea alveolaris. But is this any reason why we should fail to make the best of the knowledge we already possess?

Recognizing two different causes which bring about practically the same result, let us term them, for convenience, salivary and lithemic pyorrhea. Salivary, as the name would suggest, is due to the deposition of salivary calculus on the necks of the teeth. Usually the first to suffer are the lower incisors and upper first molars, they being in the direct path of the saliva as it is poured into the mouth. Whether this is a constitutional condition or the calculus is precipitated by some condition of the fluids in the oral cavity I am not prepared to state; however, the recession of the gums, the absorption of the process, and final loss of the teeth is the result.

In these cases neither the patient nor his ancestry gives any history of lithemia. Lithemic pyorrhea is produced by the deposition of serumal calculus on the roots of the teeth below the free margin of the gums, and we have no doubt this calculus is lithemic in origin.

As before stated, the calculus is deposited under the free margins of the gums, near the apices of the roots, where its presence causes the absorption of the process, final suppuration of the soft tissues, and loss of the teeth.

In diagnosis the urine is a factor in determining the condition of lithemia. When passed it is clear, but upon cooling for a few hours to a temperature of 50° or 60° F. it becomes cloudy, is markedly acid in reaction, and in some instances throws down a pinkish deposit which consists of free urates. Upon heating or being treated with alkalies, it becomes clear. This may be seen in perfectly healthy subjects after a heavy dinner at night, with wines, etc., and can only be regarded as a symptom when persistent without errors of diet.

You will find some persons affected at the age of thirty, others at forty, and still others at fifty. Of course, the earlier the time at which it appears the stronger you will infer the hereditary disposition to be, and the more obstinate probably will be its tendency to persist.

I will not weary you with a repetition of pathological conditions with which you are already familiar, but will proceed to the treatment.

It is necessary that the patient should have a proper idea of the value of the teeth; the desire to be treated should be strong, and the confidence in the dentist unlimited. Even after a course of treatment the patient should visit the dentist at least once in six months, so that he may observe if there is a tendency to a return of the trouble; also the patient should be careful to abstain from all habits that are contributory to the formation of uric acid.

Another point that might be spoken of at this time is the patient's ability to pay the fees incurred by the treatment,—practically the same condition as is usually given in regulating cases,—and this point should be thoroughly explained to the patient that there may be no misunderstanding later.

It is my custom when the patient presents himself to me to ask the following questions: Name, age, nationality; family and personal history; habits of eating as regards hours and favorite dishes; use of alcoholic stimulants; condition of the stomach, oral cavity, liver, kidneys, and general digestive apparatus; and do they drink much water? The answers to these questions, together with a sample of the urine, are the facts upon which I base my diagnosis.

It will be necessary to first remove all badly loosened teeth, leaving those that have enough process left to warrant treatment. From these remove all calculus very carefully, as I believe that in this lies the success or failure of the treatment. It is my custom to give several sittings for this operation. Here antiseptic mouth-washes are indicated, also stimulating applications to the gum. I believe that chemical astringents, such as tannin and alum, should be avoided, as they do more harm than good. But this local treatment is of little value without constitutional treatment.

First of all, let us consider the general principles upon which the treatment should be conducted. A simple rule, perhaps too simple, is when the urine habitually throws down acid deposits the patient should be prescribed alkalies; if, on the contrary, he has alkaline deposits he is treated with acids. In the former case he has soda or potash largely administered, and is told to drink lithia waters. Under this treatment the urine clears up and we imagine we have got rid of the uric acid, but the fact is we have simply effected its solution and by no means have prevented its formation.

We read in our medical authorities that excess of uric acid is due to faulty elimination. Then it would seem proper to stimulate the eliminative processes, in which the liver, kidneys, and skin are concerned, for at the bottom of this tendency to uric acid formation there lies what is understood as inactivity of the liver.

The theory is that the liver or some allied organ is not doing its duty as an excretory organ. The kidneys have more work than is naturally thrown upon them, and thus the solid matters, or rather some of its ordinary constituents, are augmented; not all of them, for urea is not necessarily increased, but uric acid is largely increased and is eliminated not only in solution, but in crystalline forms. Uric acid is very insoluble in H_2O, and, although the quantity thrown out may be quite soluble at the natural temperature of the urine, 100° F., when this diminishes to 60°, 50°, or 40° the acid is deposited; and when the quantity becomes larger still even the ordinary amount of fluid associated with it, at a temperature of 100°, will not suffice to dissolve the whole, and solid uric acid is deposited in some part of the urinary passages.

The treatment I pursue is to employ such agents as will stimulate the excretory action. No doubt a powerful agent for this purpose is mercury in conjunction with certain natural mineral waters, which I regard as greatly superior to the alkalies and artificially prepared lithia waters. I make this distinction between natural mineral waters and those that are artificially prepared, inasmuch as the effect is entirely different. As an illustration, take a glass of Hunyadi water slightly warmed, then take a glass of Hunyadi water, evaporate the water and take the salts, and note the difference in the effect. It will require four times as much of the evaporated salts to produce the desired effect as it will in the natural solution. Thus you will see that there is some hidden potency in the natural spring water that the artificially prepared lacks.

In my own practice I prescribe either Carlsbad or Buffalo lithia. The principle upon which these waters are beneficial is that they produce activity in all the digestive functions, and the waste matters, which have hitherto been thrown out as uric acid by the kidneys, are eliminated in some other form. There are some cases in which you will find that very small doses of blue pill may be most advantageously employed: those naturally where the appetite and digestion do not much improve under the water alone. I do not propose to say very much about the diet, for it is not to be expected that you can confine your pyorrhea patients to a strict course of dieting; still it is well to advise certain restrictions.

There are three chief elements ranked among matters ordinarily taken as diet which, in order to obtain the end in view, must be permitted to the patient very sparingly,—namely, alcohol, saccharine and fatty matters. Let me refer you to the dieting system in force at Carlsbad Springs. The use of sugar and butter is absolutely forbidden during a Carlsbad course, and were you a patient there your purveyor would not supply you with the forbidden food however much you might demand it. It seems, as a result of observation, that this system will reduce the uric acid deposit much more than the elimination of meat from the dietary.

It is well to caution the patients to be temperate in their food, taking plenty of sleep, out-door exercise, and daily baths, with a gentle use of flesh-brush and Turkish towels, which brings a glow to the skin and helps it to perform its work of carrying off waste matters; also keep the body well protected with warm underwear.

Undoubtedly some would charge me with going beyond the pale of dentistry in the treatment of this condition known as pyorrhea, but if we admit that it is due to lithemic condition of constitutional origin, then we must treat those constitutional conditions if we are conscientious.*

Dr. S. E. MacDougall, of Buffalo, read the following paper:

Gold Plates.

I am aware that this subject will not impress you with the importance or command your thought and attention as it would have done a few years ago.

Prosthetic dentistry is in the minority now, and it is a happy change brought about by the improved methods of treating and preserving the natural dental organs and restoring lost tissue with fillings, crowns, etc., and also through a better appreciation by the public of the advantage of giving the mouth and teeth that care which best conserves to their preservation and usefulness, and adds so much to the comfort and health, as well as appearance.

But while we are pleased that the majority are contributing to their health and strength by the use of the denture that nature bestowed, we cannot let the one lost sheep stray into the wilderness of indigestion for the lack of proper implements to work with; and so here is where prosthetic dentistry must find its votaries.

The time has not yet arrived when we can insert a tooth-germ and bring forth a natural denture where vacancy formerly sat, and so we must in part continue some of the old practices that came down to us from our grandfathers.

Do not be alarmed; I shall not go over the old beaten paths, with which you are all familiar in the production of a gold plate, but simply confine myself to one or two little points in its improvement which I trust will be of interest to you.

I am well aware that gold is not now much used in prosthetic dentistry, but there are cases when it seems to be indicated; and, such being the fact, any little improvement or suggestion of one must be of value to the dentist who has his own reputation and the interest of his patient at heart.

I take it for granted you are all familiar with the details of making the casts, dies, and counter-dies, and swaging the gold so as to fit the plate to the mouth. Now, the ideal gold plate is one with rubber attachments and an inner gold rim to cover the rubber. I simply desire to give my method of making this description of a plate.

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*Reference. Sir Henry Thompson, "Early History of Calculus Disease."

I do not claim any originality in this method, as I am simply carrying out some one else's ideas, and the work may be familiar to many of you.

I swage up the plate and try in the mouth to see if it fits properly, and then solder a small flattened wire around the upper edge; then I use this as a base-plate to get an articulation or bite by placing a roll of wax on it in the usual way.

Put on the articulator and arrange the teeth, either plain or gum, to suit the case. I will say right here that I always use plain teeth when possible, as you can develop in their arrangement whatever artistic taste you may possess.

After trying in the mouth to see if the effect of our arrangement is as highly satisfactory as possible, the palatal portion of teeth and plate is waxed up carefully, giving it the shape we desire the inner swaged rim of gold to be when the case is completed; from this we make a plaster cast, from which a die and counter-die must be run.

With a piece of tea lead burnished on the die, cut a pattern the shape needed for the gold. The gold, after being swaged, is placed in position over the wax to see if it is the proper size and comes to place properly just back of the teeth. If found to fit it is held in position, and a sharp-pointed instrument is used to make some marks on the plate where the lower edge of rim is to join it. Heat the plate slightly, which will permit the wax and teeth to be easily removed. Place the rim in position by the marks you have already made to guide you; clamp lightly in place, and catch with solder at two or three points.

If the rim does not fit down to place closely at all points, place it on the die and gently mallet or burnish the edge, taking care not to spring the plate. In soldering on this rim it is much better to use a broad flame, thus heating the whole plate at once until nearly reaching the fusing point of the solder, as by doing this you equalize the expansion and so run less risk of warping the plate.

After the rim has been soldered to the plate I have found by experience it is a very good plan to put some little props or braces in, extending from the upper edge of rim down to plate just back of the teeth. I usually put in three, one at median line and one at about the position of between each cuspid and first bicuspid. This adds great rigidity to the rim and plate, and also serves as an anchorage for the rubber.

These braces can be made from a little scrap of the plate; or German silver wire will do as well, as it is all imbedded in rubber. If any trouble is experienced in soldering the wire around the upper edge of the plate, it can be easily obviated by turning the plate so as to bring the flame against the inner side opposite the wire, instead of throwing onto the wire directly. When the flame is put directly on the wire it is heated to a greater degree than the plate, and so is raised to the fusing point, while the plate will help to keep the solder below this point.

If care was used when removing the teeth and wax from the plate, they can usually be placed back in position without much readjusting or waxing up. Then the case is flasked, rubber packed, and vulcanized without much difficulty.

A lower plate can be made by the same method as the above, and by covering up the rubber on the lingual surfaces a much more artistic and pleasing effect is produced.

When I have a cast that is not easily removed from the molding sand, on account of a prominent alveolar ridge and deep undercuts, or irregularity of surface, so as to cause the sand to be detached from the mold I make a core by using plumbago and plaster of Paris, or Belden's investment and plaster, and with this fill up the irregularities so the cast will draw nicely. Then this core can be removed from the cast and placed in proper position in the sand and the metal poured, as in the ordinary case.

There was no discussion, and Dr. W. C. HAYES, of Buffalo, presented the following paper:

POPULAR DENTAL EDUCATION.

In response to your committee's invitation to furnish you with a topic for discussion at this meeting, I have consented only on condition that I have the privilege of repeating the title I have used on former occasions, that of "Popular Dental Education, or the Dissemination of Dental Information to the Public."

My reason for this is that I believe that when laymen prominent in affairs plead with us to place before the public an essay on the care of the teeth, for the good that it will do to the unknowing thousands,—and we have no excuse for not doing it but the fear that it will collide with the Code of Ethics,—it is to me, to say the least, embarrassing.

Although discussions on this subject have been so general in the various dental societies as to prove conclusively that the belief in such a proceeding is as widespread as the dental fraternity itself, yet not one single thing has been accomplished to date.

The opposition by members of the dental profession to a thorough line of instruction in a series of popular papers is too well understood here to need any announcement. While concessions may be, and are, made that under certain conditions it might be done, those conditions are always aborted by the arguments of a sufficient number to preclude the possibility of anything like an approval of a universal nature.

Some men are afraid the societies will ostracize the men who do it, while others think that the charlatans who are so numerous will get more advertising out of it than the conservative dentists (which, by the way, seems to me to be rather a selfish excuse).

I sometimes think "other some" believe that "a little learning is a dangerous thing," and that what they know about teeth will get them into trouble in case the masses do acquire a little information not now possessed by them.

It is my opinion that the least that can be done by the dental profession to relieve itself of the obligations resting upon it would be to so instruct not only the individuals who come to a dentist and pay a fee for services, but the people at large, that it would be not only widely but well known how to take proper care of their mouths and teeth to the fullest extent not dependent upon expert or professional service.

Our laws recognize the duty of retaining the public health to such an extent as not only to restrict and isolate numerous sick people, but to take extreme care of the sewerage, ventilation, etc.; and at last the length of tube permitted for an infant to take its milk through from a nursing bottle has been put into an ordinance.

This being the case, and conceded by the legal fraternity to be in accordance with the constitution, why not essential to the same end that the mouth, which, as every one knows, is the starting point of all nutrition, should be considered, and the individual so instructed in its care as to avoid half or more than half the diseases now to be contended with? While my own home city is probably the healthiest city of its size in the country, it might be made twice as healthy by having its citizens properly instructed in this matter.

It is not essential that we should require all the growing youth to take a three years' course in a university, studying dentistry as a specialty (though that might be agreeable to some of us), but we might at least give them a few pages of sound instruction to be instilled into their minds during their school days. Drill them till they learn it as are learned their a b c's and multiplication tables. The result on the next generation would probably lessen the number of dentists, but would also make unnecessary their existence. So you see there would be "no great loss without some small gain."

Buffalo now sustains about two hundred dentists. Think of the years of intense agony endured by the people who are required to sustain these gentlemen each month, and remember that in a great big majority of cases the need of a dentist is because of lack of wisdom that would have saved *all* the suffering and many of the operations.

If this is not an argument in favor of disseminating information, what is it?

As you very well know, I have been urging this matter for years, and I am more than ever convinced that we have a duty to do. There is yet a great deal that the dental profession "don't know," yet there is enough that we *do* know which, if properly taught, would save a world of suffering.

We can teach them, in the first place, that the forceps are used too frequently altogether; that a tooth which can be saved in a healthy condition by a well-posted and skillful dentist is too valuable to be extracted at any time; that the cause of decay is always in the mouth, and not in the tooth, though imperfect or weakly developed teeth decay more easily and rapidly when the cause is not removed or aborted; that any acid action in the mouth attacks the enamel and starts the decay; that micro-organisms get in their work much more effectually where acid has done injury, and always more rapidly in mouths not kept strictly clean; that the decomposition of food and saliva produces acids and forms breeding-places for the disease germs; that "cleanliness is next to godliness"; that certain simple processes will, if vigorously and persistently employed, tend to prevent formation of acids and development of germs, and consequently delay decay of the teeth, as well as ward off the foul breath which almost invariably accompanies neglect.

That mixing food during mastication and insalivation with the *débris* common in neglected mouths is very unwholesome, as it necessarily is swallowed with the food, and thus impairs digestion, and later interferes with the quality of new blood formed from the ingested food.

That the presence of such contaminating materials poisons the breath when allowed to pass through the mouth instead of through the nasal passages, and again poisons or at least interferes with the purifying of the blood in the lungs, and thus is the cause of lung-troubles, blood-diseases, heart-affections, and numerous dependent conditions, all of which aggravate any lesion which might call for the aid of a physician, and the absence of which makes it possible for a much speedier recovery when properly treated.

That aching teeth, like aching heads and aching stomachs, may be cured if not endured; and not make it necessary to remove them.

That the physician who makes the most cures is the successful one, instead of the one who writes the most death certificates.

So the dentist who saves, instead of the one who extracts, the most teeth is the successful one and the one to employ.

There was no discussion, and the convention adjourned.

UNION MEETING OF THE MARYLAND STATE DENTAL ASSOCIATION, WASHINGTON CITY DENTAL SOCIETY, AND VIRGINIA STATE DENTAL ASSOCIATION.

(Continued from page 278.)

THIRD DAY—*Morning Session.*

THE convention was called to order at 9.30, and Dr. ISAAC N. CARR, of Durham, N. C., read the following paper:

A SUCCESSFUL AND QUICK METHOD OF TREATING ALVEOLAR ABSCESS.

I feel very much like offering an apology for presenting a paper before such a scientific body as this upon a subject that has been so much discussed, and were it not for the fact that we see in our daily practice so many failures resulting from misdirected efforts and improper treatment I would not venture to address you. To be brief and to the point, let me say that before any intelligent treatment can be instituted we must know the physical characteristics of a pulpless tooth, what the tubular contents are, as well as the character of the discharge through the canal. We know that the dentinal structure of a pulpless tooth is permeated with a combination of oils, fats, and animal tissues resulting from food particles and their decomposition. There are, besides these, probably always present in the decomposing contents of the pulp-canals and tubuli, sulfur compounds from the decomposition of albuminous matters. These different materials claim our careful consideration in the selection of the proper compound to render the diseased tooth thoroughly aseptic. It should be a non-coagulant. The undecomposed contents of the dentinal tubuli and the presence of oily or fatty matters should be no barrier to its penetrative quality. Five years ago last March, I believe, we found such a compound, and I come to you to-day not with anything new, but to give you my clinical experience with it, lasting over a period of more than five years. Facts are stubborn things, and whether we believe in the theory of coagulants or the non-coagulants in the treatment of pulpless and discolored teeth, the thing, after all, which we most desire is the *actual* results from clinical experience, realizing that one demonstrable fact is worth a thousand undemonstrable theories.

The compound I refer to, and which has proven so entirely successful in my hands, is sodium peroxid (Na_2O_2), and was first introduced to the profession, as you are all doubtless aware, by Dr. E. C. Kirk, of Philadelphia, in March, 1893. It is not necessary for me to take up your valuable time in explaining exactly what this is, since you are all fully aware of its chemical composition. Suffice it to say its pleasing and effective action upon foul pulp-canal and tubuli contents is due to the readiness with which it parts with its extra atom of oxygen and quickly attacks and seizes upon the hydrogen in the organic compound, and in this way destroying all germs, dissolving the oils, fats, and animal tissue which permeate the dentinal structure, and which so often act as a barrier to the ingress of agents most generally employed. This, coupled with its fine bleaching qualities, renders it, to my mind, the material par excellence for the purposes for which it is employed. It differs from the hydrogen peroxid in one very important particular, that is, the amount of available bleaching oxygen. This is stated to be by the manufacturers, Messrs. Roessler & Hasslacher, of New York, about twenty per cent. as against from three to four per cent. in the ordinary commercial solutions of hydrogen peroxid. Now, gentlemen, I can truthfully say that my experience with this preparation has been more pleasing and the results more gratifying and successful than anything I have ever used during the more than twenty years of actual practice. I speak to you, therefore, confidently, and assure you that the results obtained are not fictitious, but are actual, and can be verified at any time in the mouths of hundreds of patients whose pulpless teeth are to-day living monuments to the efficacy of this simple but powerful remedy. Every case treated since April, 1893, has been carefully recorded in a book kept for the purpose, in which notes have been made describing conditions when presented and history of the case. Then, too, the cases have been kept up with and inquiries made from time to time of those patients who live in other towns as to how the teeth were doing, and frequent examinations of the cases which annually or semi-annually come under my observation, and I can truthfully assure you that ninety-nine per cent. of all the cases treated have been successful so far as I have been able to learn. Please do not think for one moment that I attribute this success to any skill that I may possess, but rather to the potency of the remedy.

Now, with a short description of how I treat an abscessed tooth, my efforts to entertain you will have ended. We will take a difficult case, a lower molar with the two tortuous and almost inaccessible canals generally found in the anterior root. Tooth is sore and throbbing, no fistulous opening, and no filling. Wash out all *débris* from cavity with three per cent. pyrozone, adjust rubber-dam carefully and securely, dry out cavity with absorbent cotton, open into pulp-cavity by cutting away as little of the crown as possible, wash out cavity and chamber with three per cent. pyrozone again, then draw out the pyrozone by means of a syringe and dry again with cotton. Now you are ready to begin your real treatment. Take a minim syringe, as sold by The S. S. White Company, and put one or two drops of a fifty per cent. solution of sodium peroxid in the pulp-cavity; then, with a fine, smooth platinum broach, work the remedy into the canals, being careful not to use too much force; the broach will help the remedy to go to the apex and into the sac, if there is one there. You will now find that you have a soapy mass in the chamber; wash this out as before with three per cent. pyrozone, draw it out with the syringe, and dry again. Put another drop or two of the sodium peroxid in the chamber and use the broach again in the same manner, being always careful not to force any of the pulp-canal contents through the apical foramen; it does no harm if a little of the remedy should find its way through, and if there is a sac there it must enter it, and by its own action will force the contents up through the canals. Continue this treatment several times, until the saponifying action ceases, when the chamber and mouths of canals will be found beautifully bleached, as well as sweet and clean. Now, after all the sodium peroxid has been washed out by use of the three per cent. pyrozone and minim syringe and the cavity dried with absorbent cotton, a fine Donaldson broach, made smooth and fastened in a little handle, is sterilized and a few shreds of asepticized absorbent cotton are twisted around the broach, and the canals dried as well as possible by this means. Finally the same broach, with a few shreds of cotton impregnated with oil of cassia and iodoform, is carried down into each canal and twisted around so as to mop the walls of canals with the dressing, the cotton and broach are withdrawn, and the continuous current hot-air syringe is then brought into use. This will vaporize the oil and iodoform and cause it to permeate the dentinal structure of the tooth. The hot air should be used until the patient gives warning of pain from the heat. The canals are then dressed with cotton impregnated with the oil and iodoform, the chamber and cavity filled with temporary gutta-percha stopping, and the patient dismissed for two days, with instructions to report in the interim should any trouble occur. Not one in a hundred ever reports before the second day, when you are told that the tooth has felt perfectly comfortable ever since leaving the office, that the soreness is all gone, etc. You can now adjust your dam as before, and, using antiseptic precautions, proceed to excavate and prepare the cavity for the reception of a filling. This you did not do at first sitting because of the tooth being sore. The dressings are removed from the roots, and their appearance indicates the healthful condition of the roots. You then fill them with whatever material you can make the best root-filling. I usually use gutta-percha, and if the canals are very fine will melt a little wax into them. I believe it makes no difference what you fill the root with, provided you seal the apical foramen hermetically. The foregoing method, gentlemen, has been successful in my hands for five years, and I have used no other during that time.

Discussion.

Dr. J. N. CROUSE, Chicago, thought oxychlorid of zinc much better to seal the root with than gutta-percha, as the latter will leak.

Dr. G. LENOX CURTIS, New York, said the practice described in the paper, if carried out, would result in success in a very large majority of cases, but thought it would be necessary to open up the sac at the end of the root and clean it up.

Dr. W. A. MILLS, Baltimore, approved of the use of pink gutta-percha to fill the apex of the root. It will swell after insertion and make a perfectly tight seal. In many cases it will extend quite beyond the end of the root, but its presence does not cause any irritation. The reason it is so perfect is because it leaks first and then swells up. The sac, if one exists, must be broken up or trouble will arise again, except in cases where nature intervenes and by the action of the white blood-corpuscles encysts the sac.

Dr. L. ASHLEY FAUGHT, Philadelphia, said that it was his practice to fill a canal with pink gutta-percha, and to leave it extend through the end of the root will cause irritation.

Dr. F. F. DREW, Baltimore, asked Dr. Carr if he had ever used hydronaphthol.

Dr. CARR said his satisfaction with the material described was so great that he had not experimented with other methods.

Dr. DAVID GENESE, Baltimore, said that it made little difference what a pulp-canal was filled with, so the filling was stable; but in certain conditions anything that protruded through the foramen would set up irritation.

Dr. CARR closed the discussion, saying he used gutta-percha in filling root-canals because he would not fill with anything which he could not remove if necessary, though he never had the necessity of removing a single such filling that he had inserted, except one, which was a tooth that he had treated two years previously; the gutta-percha filling was found to be in as good condition and perfect as when it was put in.

The subject was passed, and Dr. E. E. CRUZEN, Baltimore, M.D., read the following paper:

PROSTHETIC DENTISTRY.

Prosthesis is the restoration of any part of the anatomy by artificial means. When we apply it to the dental organs we term it "dental prosthesis," or "prosthetic dentistry." The work may be crudely done, and imitate nature but poorly, yet it is none the less prosthetic dentistry; and here I wish to suggest "esthetics in prosthetic dentistry." It is not my intention to speak of plates or the arrangement of teeth thereon, for that ground has been covered by others, but rather to call your attention to the smaller things, and especially the many little things that can be done in porcelain work to so great advantage from an esthetic standpoint. Our patients come to us for treatment. We are to replace for them what nature has suffered them to lose,—a crown of a tooth, the tooth itself, or teeth,—and in doing this we must imitate nature so closely as to deceive the eye, if within our power to do so; and it is within our power many times and we fall short of it, and many times, too, because we have not given sufficient thought or perhaps time enough.

If we think it is too much trouble, and neglect to look after the little things in the practice of prosthesis, we make a great mistake, for it is the close attention to detail that enables us to obtain the happy results of artistic work; and I might add that unless a man is thoroughly in accord with the practice of his profession he cannot expect to get the same results as the man who takes up his work as a pleasure rather than a task. If we are not doing our best, let us give a little more thought to the artistic replacement of the lost organ, a little more care in the selection of a tooth that will harmonize in shape and color.

In crowning and bridging we are much inclined to show too much gold, thereby attracting the eye to what many times would appear far more natural if the gold were not seen. The glitter of so much gold in the anterior part of the mouth is objectionable, and should be avoided always if possible. There seems to be a growing tendency to place all-gold crowns in the anterior part of the mouth, and we meet people with these crowns even upon the incisors, and against such practice we should protest, for surely we do justice neither to our patients nor ourselves when we disfigure their mouths by the undue showing of so much gold. Let us not forget, in the mad rush for money at the present day, that in our profession we have a noble calling, if we will make it such, and that it is not all the mere getting of money that we should strive for, but let our thoughts turn to how well we can restore the organs that in the practice of our profession we are called upon to treat; our fees then are well earned and more willingly paid.

For individual crowns there is nothing that so artistically replaces the lost one as the all-porcelain crown. For a number of years the Richmond crown has been a favorite with many, and is to-day. But the porcelain crown with band has every advantage, with the addition of the band being covered with porcelain, thereby hiding the metal from view. In construction it is similar to the Richmond, in so far as having a cap on the end of the root with the post for anchorage in the canal. The pins of the tooth selected, either platinum or rubber, are bent around or soldered to the post, waxed to place, and removed; the cap and pin invested in plaster and silex just enough to hold the cap in place; the wax is boiled out and the back and band are covered with body, and baked in the small furnace such as is used for the purpose. The bands are best made of iridio-platinum; being stiffer, it avoids the spawling off of the porcelain covering. All soldering is done with pure gold. For a molar or bicuspid better results are obtained by using plain rubber teeth and soldering post and pins to cap and proceeding as just described.

If it is desired to band a Logan crown we make a cap as for the Richmond, allowing a hole for the pin to pass through; the crown selected is then ground from labial to palatal aspect, to make a wedge-shaped space when the crown is in place; the face of the crown just touching the cap, it is waxed to place and removed, invested as described in plaster and silex, the wax boiled out, the space packed and the band covered with body and baked, when it is ready to set, and is one of the strongest kind of crowns.

To make a perfect joint for the Logan crown by use of porcelain is simple, and does not consume much time. We proceed by grinding the crown from labial to palatal aspect to make a wedge-shaped space between root and crown, the face of the crown touching the root-end. Then a disk of well-annealed platinum, about 35 to 37 gauge, a little larger than the root-end, with a hole for the post to pass through is made, and with the post run through a little ball of stiff wax (paraffin answers very well) put to place over the root-end and the crown pressed well and firmly to place and removed, when the impression of the root-end will be upon the disk of platinum; the surplus edges are clipped and turned up very carefully, so as not to change the shape of the impression. It is then invested in plaster and silex, just deep enough to catch the edges of the platinum; the wax is boiled out and the space is packed with body and baked, after which the edges are ground to the line indicating the root-edge, when it is ready to set, and, if carefully done, a perfect joint is the result.

We are sometimes confronted with the problem of restoring to a natural shape a malformed or peg-shaped lateral, and wish to preserve the pulp intact. We accomplish this in an artistic way by shaping the tooth so as to permit of a cone-shaped jacket of platinum being made to fit it, then grinding out the back of a plate or rubber tooth to make a thin shell or veneer, which is filled with body, placed over the jacket, and baked, which, when finished, restores the tooth with an effect which could be obtained in no other way.

We occasionally have cases for the replacement of a tooth by means of a plate where there has been excessive absorption of process or recession of gum due to pyorrhea, and we find it impossible to get at the supply houses just what we need to replace a tooth in such cases; and here again we find an advantage in porcelain work, by burnishing thin platinum over the place to be restored, allowing it to run over the ridge slightly, waxing the tooth to place, investing and soldering the tooth to the platinum, packing and contouring the matrix with body and gum-enamel and baking, when it will be ready to attach to vulcanite in the usual way.

There are many ways the ceramic art can be used to great advantage in prosthetic dentistry. The making of a block of six, eight, or ten teeth, using continuous-gum teeth, getting an artistic effect that is difficult to obtain by use of block teeth as we find them; the uniting of the anterior blocks with body and enamel insuring a perfect joint, adding body to change the shape of a tooth, adding gum-enamel to a tooth, and many other things which are suggested by the inventive mind of the dentist himself. By the use of the furnace we are enabled to get artistic results in the staining of teeth with the mineral paints, such as are used for decorating china, whereby we can match in color teeth that we cannot match otherwise.

FIG. 1.

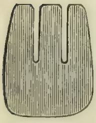


FIG. 2.

FIG. 3.

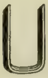


FIG. 4.

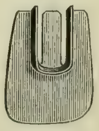


FIG. 5.

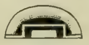


FIG. 6.

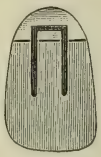
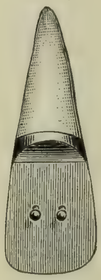


FIG. 7.



One of the most perplexing things we have had to contend with has been the replacing of a facing on a firmly anchored bridge, when the bite has been close, making the backing thin, so that to drill through and attempt to rivet only resulted in final failure. When the backing is heavy enough, there are a number of methods by which repair may be made with comparatively good results, but those thin backings have given us an endless amount of trouble; such had been my experience when I devised a method of repair which has since given me much satisfaction in this class of work. I have used it a number of times in the past four years, and as yet have not had any failures so far as I know, nor have I had any colleague who has given it a trial to report failure; and with the hope that it may be of service to some one when a case presents for repair I will describe the method.

As the case presents the facing is broken away, leaving the headed pins protruding from the backing. This is to be our anchorage, and they must not be disturbed. We proceed by first cutting out of iridio-platinum, No. 30 gauge, a backing the size of tooth to be replaced. This is placed against the pins and a scratch made on the backing, indicating the center of each pin. Then two slots are cut just wide enough to permit of the passage of the pins (Fig. 1); the backing is then placed in position on the bridge, and a piece of platinum wire filed or hammered square to just slide between pins and under the heads (Fig. 2). This wedges the backing to place. This is soldered to place; next a little band of platinum, bent to U-shape (Fig. 3), is fitted around the outer edge of the slots and soldered (Fig. 4). This is dressed down until it will just clear the heads of the pins, when a top is soldered over it, making a box to engage the pins (Fig. 5). The tooth selected is ground out in the back sufficiently to allow it to go down to place and cover the box (Fig. 6). It is then filled with body, placed over the box, and baked; the box is then filled with cement and set in place. Fig. 7 shows the facing complete.

In presenting this paper for your consideration it has been with the hope that it might stimulate some thought in the matter of prosthetic work from an esthetic view, and if I have succeeded in bringing some one to reflect upon the question and profit thereby I feel that I am well repaid.

Dr. B. J. Cigrand felt that any new idea in prosthetic dentistry on its esthetic side should be received gladly. People are opposed to the display of gold, and whatever deviates from the normal appearance of the teeth should be opposed. Crowns should never be put on teeth which can be filled. There has been much discussion in Chicago recently about the use of oxychlorid of zinc in setting crowns. It is claimed that there is a trace of arsenic in the cement which destroys the pulp.

The subject was passed, and Dr. R. W. Morse, Lansing, Mich., read the following paper:

The Eruption of the Lower Third Molar.

The title of this paper immediately suggests numerous conditions which are of more moment to us than the mere process. And while the subject is worthy of more technical treatment than it receives at my hands, I selected the title to use it in its more comprehensive sense.

The genesis of the lower third molar is similar to that of the first and second molars in the fact that it is produced by an independent follicle, formed by the dipping into the embryonic tissues of a portion of the infant layer of the epithelium, while the permanent bicuspids and anterior teeth originate from the buds which arise from the follicle of the tooth which it succeeds.

The most marked characteristics of the growth of this tooth are the length of the period which it lies dormant in the jaw, the slow process of formation, the shapes it assumes, and the painful condition accompanying its advent into the dental arch.

The calcification of the cusps of the lower third molar takes place usually about the eighth or ninth year. By the tenth year the enamel is about all formed, and the tooth is erupted at about the age of twenty.

The conditions that surround this tooth are somewhat different from those with which the others had to contend, and to them are due the difficulties that arise. A survey of the location at which the lower third molar is expected to appear is at once suggestive of trouble. The first thought is that there is not room between the second molar and the ramus of the maxilla for the additional tooth; this is often the case, but usually nature provides for it. The process here at the angle merges into the more dense bony structure, and is much broader on its surface than it is found to be elsewhere. The soft tissues are thick and fibrous, adding very materially to the difficulties. As the space is limited, the crown of the third molar is usually in contact with the second molar at its cervical margin; and, as this surface is concave, it acts as a socket into which the rounded surface of the crown of the third molar rests, and cannot proceed in its progress of advance until the second molar is moved forward or the maxilla has lengthened sufficiently to let it pass. When the line of advance is at nearly a right angle with the distal surface of the second molar, the third molar is held securely in place and is said to be impacted.

The distal curvature of the roots of almost all lower molars, and particularly the third one, is probably due to a dragging movement produced by the lengthening of the maxilla while the crown is being calcified and before the calcific material has been deposited into the roots, as the growth is presumably greater at the point in the maxilla where the tooth is located; and as the crown of the tooth is slightly in advance of the root it would be carried forward farther than the end of the root, which, being still soft, is given as much curvature as the crown moves forward.

There are several causes to which can be attributed the length of the period of eruption of this tooth: first, the density of the bone; second, the curvature of the roots, which certainly retard eruption, as the bone has to be absorbed to allow their progress; third, the constricted space and the necessity for the elongation of the maxilla, or the movement of the second molar, or else a pivotal movement of the third molar to unlock itself from the second molar.

As all of these movements are very slow in progress, it is not strange that after the mesial cusps have appeared it is sometimes one or two years before the tooth is sufficiently through so as not to make trouble.

The third molar up to this period, when it is first seen, has caused its possessor little or no inconvenience, so that we can make it a rule that the disturbances due to the eruption of the lower third molars do not antedate the appearance of the cusps through the gums.

Now we come to the disturbances, the causes of which are usually due to the tooth being impacted or to inflammatory action. The impacted tooth is found, as before described, with the crown locked against the tooth in front of it, and is in a difficult and even dangerous position from which to extract it, as it necessitates a great strain upon the jaw and a possibility of thereby fracturing the bone. If the second molar is at all poor, it may be better to sacrifice it to taking the chances of inflicting a severe injury. This situation occurred in my own mouth, and the impacted tooth is and has been for years a useful member.

The inflammatory condition is the one most frequently met with, and is usually unsatisfactorily treated. Extraction relieves the trouble, but is usually accompanied with considerable laceration, and is seldom indicated.

The crown of the tooth at this stage has emerged only partially, and presents a decreasing oval form from the alveolus to the occlusal surface which is very hard to grasp with the forceps. And, as the process is so broad and thick here, it is difficult or impossible to cut through it, as is done farther forward when necessary. There is also great danger of fracturing the jaw if the second molar is used for a fulcrum for the use of the elevating forceps when trying to extract the third molar from this position, so we look for other means of relief. Scarifying the gum and the removal of portions of it is sometimes desirable, but let us remove the cause, which is undeniably the rational thing to do. The tooth and the gum are only incidental to the disturbance, but not the cause of it. The cause consists of a colony of micro-organisms located in the space formed between the mucous membrane and the enamel of the tooth. As there is no attachment of the flesh to the enamel, there is a space between the two extending to the margin of the enamel.

This membrane has been rendered pregnable to their attacks by the irritation set up by mechanical injury from biting upon the tissue covering the crown of the tooth, or through the introduction of some irritating material, or the confinement of the excretions of the surface of this membrane. This tends to lessen the powers of resistance to the inroads of the bacteria. Calculus is sometimes present, but usually in the later stages.

The serious trouble comes with the introduction of the microbes, and they do thrive in this ideal home of bacteria. We find them forming a glutinous mass of the color of cream, sometimes surrounding the entire tooth where the gum extends well up the sides, but invariably the main colony is at the most inaccessible point to reach, which is located behind the tooth and as low down as the enamel goes; being confined here, and their excretion absorbed, they produce inflammation of the parts, soreness of the muscles of the tongue and throat, and accompanied with more or less swelling. This produces a tightening of the tissues covering the crown of the tooth, and thereby confining the contents of this pocket and insuring its absorption. Fever and septicemia follow with their constitutional symptoms. The pus will sometimes burrow its way out, and thereby be relieved, as occurs with alveolar abscess and occasionally in pyorrhea alveolaris; but more often the pus will escape through the opening around the tooth and no serious results follow. All this can be prevented by cleansing the pocket and thus removing the cause. This in the early stages is quite simple. An annealed piano-wire broach is used, on which a small amount of cotton is wound, and the point is then curved to pass over and behind the crown of the tooth. A three per cent. solution of pyrozone or peroxid of hydrogen are excellent assistants in cleansing this space. Pass the broach between the gum and the tooth, beginning at the side and wiping around the tooth a number of times; then in a like manner use a ten per cent. solution of trichloracetic acid, and if the tissues have not been lacerated the relief is at once apparent. Pulverized crystals of cocain, introduced in a like manner, are also very soothing when the pain is severe. The various syringes have not answered the purpose as well in my hands as this method. The points are too large, and cannot be conformed to the shape of the tooth as well as the broach.

In some cases it is necessary to lance the gum tissues to gain access to the pocket. The bleeding relieves the congested condition, but the removal of the confined poisonous products is what produces the cure.

The trichloracetic acid acts as an instantaneous bactericide, cauterizing them as well as the surrounding tissues, which it stimulates to a healthy condition; and, as it is a strong astringent, the absorption is immediately stopped by the contraction of the mucous surface.

There are several conditions which occur in the mouth that are allied to this congregation of microbes, and the same treatment is indicated. Among them are the abscesses with fistulous openings, pockets in pyorrhea alveolaris, and all the inflammations of the gingivæ, and in tonsillitis the cause is materially the same, and the same treatment gives relief. This treatment is indicated when the trouble is principally in the larger crypt of the tonsil, the orifice to the pocket being readily reached and cleansed, as previously described. The treatment is simple and the relief magical. Care should be taken not to use an excess amount of the solution, and to keep it out of the air-passages. I mention this as the trouble is so common and the remedy so simple and efficient, and is not practiced by the medical profession as I have yet learned.

The third molar is a creature of circumstances and understanding; the circumstances is part of our business, so do not dismiss the subject by saying that these teeth are of no good anyway, which I will admit is sometimes the case. But is it not true that rapid destruction of those teeth is due more often to the fact that they are not thoroughly cleansed than to any fault of construction?

In the treatment of the diseases of the mouth, as well as of the system generally, to obtain the highest degree of success, we every day see the necessity of being able to discover the cause of the disease in order to remove it.

In making examinations of the contents of the spaces around these teeth I find the white growing pus-products predominate, but the number of cases thus far examined is not sufficient to identify any particular germ as the cause of these disturbances; but thus far the Staphylococcus pyogenes aureus is the most in evidence.

Dr. W. A. MILLS, Baltimore, said that a case of swelled jaw came to him and he extracted the third molar; after a few days, being sent for, he went to the patient's house and found that the swollen jaw had got worse, and a physician had been called in who found the swelling was a cancer. Subsequently the girl had died. He had made a mistake in diagnosis because he had not inquired into the history of the family. Several members of the family had died of cancer. If he had known this he would not have made the mistake.

(To be continued.)

DENTAL ASSOCIATION OF NEW SOUTH WALES.

THE fifth annual meeting of the Dental Association of New South Wales was held at the Australia Hotel, on January 3, 1899, and was well attended. Dr. A. Burne, president, occupied the chair.

The president's report for the past year dealt, among other matters, with the present position of the dental bill and the untiring work of the council in its struggle to get at least eight clauses of the bill passed in a house talking nothing but federation. The members expressed their confidence in the council and appreciation of their endeavors, and felt confidence in the final result of the bill being passed.

The balance-sheet, being read, showed a balance in hand of £97 17s. 3d., which, after deducting all the heavy expenses incurred, proved very satisfactory.

The following officers were elected for the year 1899-1900: Dr. A. Burne, president; Messrs. H. Paterson and S. Chaim, vice-presidents; Dr. O. Davis, hon. treasurer; Messrs. C. C. Marshall, H. S. Newton, E. A. Gabriel, J. S. Darton, committee; Messrs. B. Corbett and C. Chandler, auditors; Mr. H. Taylor, hon. secretary.

The president, Dr. Burne, in returning thanks for his re-election, pointed out the present position of the dental bill and the prospects of its finally becoming law in the near future; he also expressed thanks to the council and secretary for their support during a very trying term of office.

A vote of thanks to the chairman closed the meeting.

DENTAL COLLEGE COMMENCEMENTS.

PENNSYLVANIA COLLEGE OF DENTAL SURGERY.

THE forty-third annual commencement exercises of the Pennsylvania College of Dental Surgery were held in the Academy of Music, Philadelphia, Pa., on Thursday evening, March 30, 1899.

The address to the graduates was delivered by Professor C. N. Peirce, D.D.S.

The number of matriculates for the session was three hundred and twenty-eight.

The degree of D.D.S. was conferred on the following graduates by I. Minis Hays, M.D., president of the college:

George Algor	New Jersey.
James Agnew	Canada.
Sidney F. Bridges	Canada.
George N. Bates	Ohio.
George C. Bryant	Pennsylvania.
Gilderoy O. Burlew	New Jersey.
John Brandt	Minnesota.
Lloyd D. Bickley	Pennsylvania.
Thales D. Bugbee	Vermont.
John W. Biddle	Pennsylvania.
George W. Boyd	Pennsylvania.
John D. Benjamin	Pennsylvania.
Ruth Bitting	Pennsylvania.
Malcolm H. Barr	Pennsylvania.
Wilson W. Bolton	Pennsylvania.
George R. Cook	Pennsylvania.
Francis B. Crane	Connecticut.
Daniel R. Crump	Pennsylvania.
Fred. W. Carroll	Massachusetts.
H. H. Cleaveland	Massachusetts.
John C. Curry	Pennsylvania.
William M. Chandler	Connecticut.
Erwin E. Connor	Massachusetts.
James E. Collins	Quebec.
Henry B. Campbell	New Jersey.
Anna M. Carstan	Germany.
George R. Doan	Pennsylvania.
Walter Daniel	Pennsylvania.
Carl H. DeLonge	Germany.
Charles H. Dunham	New Jersey.
Calvin A. Davis	Pennsylvania.
Albert N. Drury	New York.
Hattie A. Dean	New York.
Fred'k J. R. Dean	New York.
Leopold A. DeRosa	Egypt.
Richard Ellis	New York.
Thomas J. Evans	Pennsylvania.
Emil Frey	Switzerland.
Richard M. Flaherty	Pennsylvania.
William P. Felch	New Jersey.
L. I. Fleming	Canada.
Helen Fox	Russia.
Ami H. Gunther	Ohio.
Frank D. Geer	Pennsylvania.
Robert E. Grennan	Vermont.
Ralph S. Hunt	Massachusetts.
Arthur G. Hodge	New York.
William Hecht	Pennsylvania.
E. V. Hendrixson, Jr.	Pennsylvania.
Elizabeth Y. Hood	New Jersey.
Sophie Hullstrung	Germany.
Fred. H. Johnson	Canada.
Marks Kohn	Pennsylvania.
Annette L. Kowler	Bulgaria.
Charles E. Kantz	Pennsylvania.
Sophia Korotkin	Russia.
William D. Knecht	New Jersey.
Victor E. Koch	Missouri.
Julius A. T. Krieg	Germany.
John H. Keiser	Pennsylvania.
Clara M. Loetschert	Germany.
Leigh A. Langstroth	Canada.
George W. Laidlaw	Scotland.
Lemuel J. Morgan	Pennsylvania.
F. C. Marggraff	Connecticut.
K. C. MacDonald	Canada.
William H. Mohler	Pennsylvania.
Roy D. Marsh	New York.
Lester L. McKay	Pennsylvania.
Frank R. Miller	California.
J. Preston Metzger	Pennsylvania.
Frederick W. Mace	Pennsylvania.
Francis J. Mahoney	Massachusetts.
Justin B. McCarthy	Jamaica.
Charles P. Moore	Canada.
John C. Nugent	Pennsylvania.
J. Courtney Nedwill	Ireland.
Alice M. Norton	Pennsylvania.
Reuben R. Picard	Pennsylvania.
Charles D. Peterson	Pennsylvania.
John G. Powell	Pennsylvania.
Walter C. Richman	Pennsylvania.
John H. Ruth	Pennsylvania.
Max Raff	Pennsylvania.
Alfred C. Russell	Canada.
B. A. Richardson, Jr.	Indiana.
Franklin Rightmire	New Jersey.
Robert R. Royster	Massachusetts.
William E. Richards	Pennsylvania.
W. Reeves Robinson	New Jersey.
Thomas D. Renfrow	Kentucky.
David F. Strock	Ohio.
James F. Shute	Canada.
George H. Spieker	Pennsylvania.
LeRoy D. Shafer	Pennsylvania.
Maurice E. Sargent	N. Hampshire.
Conrad Schroeder	Pennsylvania.
William M. Stetler	Pennsylvania.
Harry M. Sober	Pennsylvania.
S. A. Sturdevant, Jr.	Pennsylvania.
Thomas Thomson	Canada.
Edwin D. Trimmer	New Jersey.
Guy C. Tower	Massachusetts.
Flora E. Upson	Connecticut.
Frank T. Waters	Massachusetts.
Martin I. Wesseler	Germany.
James E. White	Canada.
Julia C. Wood	Pennsylvania.
Albert K. Wood	New Jersey.
J. Finley Wark	New York.
Alexander W. Watt	Canada.

PHILADELPHIA DENTAL COLLEGE.

The thirty-sixth annual commencement exercises of the Philadelphia Dental College were held in the Academy of Music, Philadelphia, Pa., on Friday evening, April 7, 1899.

The address to the graduates was delivered by Professor Henry C. Boenning, M.D., and the valedictory address by Charles N. Reinig, D.D.S.

The number of matriculates for the season was three hundred and thirty-four.

The degree of D.D.S. was conferred on the following graduates by ex-Governor James A. Beaver, president of the board of trustees:

Edmund J. Abbott	Connecticut.
Alejandro Andrade	Colombia, S. A.
Walter K. Ashton	Pennsylvania.
Walter S. Bahner	Pennsylvania.
Wm. Z. Barrett	Ohio.
Henry D. Bedford	New York.
Wm. O. Beecher	Connecticut.
Joseph Birnbaum	Roumania.
Oliver L. Braud	Louisiana.
Manuel J. Brazill	Connecticut.
J. B. Calvo	Colombia, S. A.
H. L. Chandler	Pennsylvania.
A. Chiavaro, M.D.	Italy.
Ira J. Coe	New York.
Johan Cohn	Roumania.
Forrest A. Cousins	Maine.
Chas. F. Cornelius	New York.
Edgar D. Crawford	Pennsylvania.
Frank L. Davies	Maine.
Edward H. Derr	Pennsylvania.
Bessie A. Douglass	Pennsylvania.
Clara A. Edwardes	Jamaica.
Chas. B. Fickes	Ohio.
Henry G. Fischer	Pennsylvania.
Michael F. Flynn	Massachusetts.
Shelton C. Frederic	Alabama.
C. R. Fundenberg	Pennsylvania.
Wm. J. Galbraith	Canada.
Louis E. Gieser	Delaware.
Wm. C. Ginter	Pennsylvania.
Frank H. Goddard	England.
W. S. Goodwin	Canada.
Chambille Gordon	West Indies.
John J. Gribbin	Washington.
Geo. H. Griffith	New Jersey.
Frank J. Haas	Pennsylvania.
Robert T. Hall	California.
Hugo Herz	Hungary.
Ralph Herz	Hungary.
Samuel S. Hess	Pennsylvania.
Isaac B. Jacobs, 3d	Pennsylvania.
Arthur V. Jolliffe	Canada.
James C. Kelly	Massachusetts.
B. G. Klinetob	Pennsylvania.
J. F. Knowlton	Ohio.
S. L. Landon	New Jersey.
T. L. Larseneur	Canada.
Harold Lawrence	Canada.
Hardouin Lionais	Canada.
R. W. MacDonald	Pennsylvania.
Jno. A. MacNeil	Canada.
W. A. MacNicholl	New York.
John L. Mansir	Massachusetts.
Wilbur C. Marsh	Pennsylvania.
Geo. A. Martin	Canada.
Dorothy Maryson	New York.
Hubert F. Milford	Australia.
Edw. H. Morrison	California.
S. G. Newcomb	New Jersey.
E. B. Newell	Michigan.
W. I. Northrop	Oregon.
Grant W. Osborne	Pennsylvania.
Allie N. Osgood	Maine.
Harold C. Parker	New York.
Frank H. Paul	Pennsylvania.
Zotique J. Payan	Rhode Island.
Alexander Peacock	Canada.
N. V. Pockley	Australia.
B. Frank Reade	Canada.
Charles N. Reinig	Montana.
Conrado Rivera	Porto Rico.
Charles E. Rose	Pennsylvania.
James T. Savery	Pennsylvania.
C. C. Schneider	Connecticut.
Martin F. Shannon	Pennsylvania.
Wm. C. Sharkey	Pennsylvania.
Walter B. Shaw	Connecticut.
Perry R. Skinner	New York.
Edw. H. Smith	Massachusetts.
Edw. R. Smyth	Pennsylvania.
Edw. A. Sprague	Maine.
Emil E. Steiner	Pennsylvania.
Wm. L. Stevenson	Pennsylvania.
Wm. P. Stone	Massachusetts.
Edw. D. Stout	Pennsylvania.
Charles H. Tilton	New York.
Orie O. Tolles	Pennsylvania.
Francis H. Tomlin	New Jersey.
R. C. Turner	New York.
B. M. Van Dervoort	Colorado.
Sidney V. Vega	Louisiana.
Lewis J. Walker	Pennsylvania.
Arthur W. Walsh	Natal, So. Africa.
Charles F. Wilbur	Connecticut.
John B. Winslow	Maine.
E. A. Zoberbier	Germany.

CINCINNATI COLLEGE OF DENTAL SURGERY.

The sixth annual commencement exercises of the Cincinnati College of Dental Surgery were held in the Auditorium, Cincinnati, Ohio, on Thursday evening, April 6, 1899.

An address was delivered by Professor G. S. Junkerman, M.D., D.D.S., dean, and the valedictory address was by Professor O. W. Martin, A.M.

The number of matriculates for the session was one hundred and nine.

The degree of D.D.S. was conferred on the following graduates by Mr. Francis B. James, president of the board of trustees:

Fred. C. Ahlers	Ohio.
And. D. Armstrong	Ohio.
Arthur D. Bowyer	Ohio.
T. N. Crowley, M.D.	Illinois.
Orsa B. Coxen	Indiana.
Linus H. French	Ohio.
Philip N. Foley	Kentucky.
B. Frank Gray	Ohio.
Geo. E. Harper	Ohio.
Geo. W. Halley	Ohio.
S. K. Hirschman	Ohio.
A. L. Hollowell	Ohio.
Walter A. Holmes	Ohio.
James J. Hill	West Virginia.
Fred. J. Homann	Indiana.
Elijah P. Houk	Indiana.
Wm. C. Johnson	Kentucky.
William E. Knight	Ohio.
Richard J. Morris	Kentucky.
Joseph H. Nuxoll	Kentucky.
Chas. W. Owens	Indiana.
Wm. H. Palmer	Ohio.
Everett C. Perry	Kentucky.
Homer D. Rymer	West Virginia.
Claire B. Schleef	Missouri.
Milton A. Smith	Indiana.
Arthur D. Sloan	Ohio.
Walter J. Teeters	Ohio.
Carl M. Voelkel	Ohio.
Geo. W. Walter	Indiana.
Alfred H. Wagner	Ohio.
J. Herbert West	Ohio.
John J. Walker	Ohio.
Walter L. Wright	Ohio.
Benj. F. Wade	Ohio.
Jas. R. Youngson	Ohio.

UNIVERSITY OF OMAHA, DENTAL DEPARTMENT.

The annual commencement exercises of the Dental Department of the University of Omaha were held in Omaha, Neb., on Tuesday evening, April 4, 1899.

The address to the graduates was delivered by J. B. Meikle.

The degree of D.D.S. was conferred on the following graduates by Rev. David R. Kerr, Ph.D., D.D., chancellor of the university:

Cecil E. Beebe	Nebraska.
Zoro D. Clark	Nebraska.
Arthur G. Greene	Iowa.
Alfred N. Hagan	Nebraska.
Charles O. Hald	Nebraska.
Milton R. Hendrix	Nebraska.
Walter J. Hostetter	Iowa.
Percy J. Hunter	Nebraska.
Geo. H. Kay	Nebraska.
Fred. N. Kemp	Missouri.
Pauline Koobetsheck	Iowa.
Leslie G. Meyers	Nebraska.
Chas. B. Rich	Nebraska.
John G. Somers	Nebraska.

CENTRAL COLLEGE OF DENTISTRY.

The annual commencement exercises of the Central College of Dentistry were held in Plymouth Church, Indianapolis, Ind., on Tuesday, April 11, 1899.

The number of matriculates for the session was fifty-four.

The degree of D.D.S. was conferred on the following graduates by Dr. J. E. Cravens, president of the college: Charles Bamhill, Frank Terrill, William Card, Herbert Stomcifer, all of Indiana.

KANSAS CITY DENTAL COLLEGE.

THE annual commencement exercises of the Kansas City Dental College were held in Coates Opera House, Kansas City, Mo., on Saturday, April 1, 1899.

The number of matriculates for the session was eighty-five.

The degree of D.D.S. was conferred on the following graduates by Alton H. Thompson, D.D.S., president of the college:

D. M. Austin	Missouri.
F. H. Beaumont	Nebraska.
P. J. Bentz	Nebraska.
C. W. Bull	Kansas.
J. W. Bamber	Kansas.
W. L. Caldwell	California.
J. R. Cowdery	Kansas.
R. A. Chenoweth	Kansas.
Lloyd Davis	Illinois.
W. H. Hargis	Missouri.
F. J. Hunger	California.
C. E. Hocker	Missouri.
Harry House	Kansas.
M. I. Hults	Kansas.
O. C. Haldeman	Missouri.
Henri Letord	Missouri.
M. A. Miller	Nebraska.
E. R. Mathers	Nebraska.
C. A. McAntire	Missouri.
C. A. Martin	Kansas.
R. S. McKee	Kansas.
O. A. Pennock	Illinois.
W. A. Swisher	Kansas.
O. D. Wells	Kansas.

WESTERN DENTAL COLLEGE.

THE ninth annual commencement exercises of the Western Dental College were held in the Auditorium Theater, Kansas City, Mo., on Tuesday afternoon, April 4, 1899.

The annual address was delivered by Hon. James A. Reed, and the faculty address by W. F. Kuhn, M.D.

The degree of D.D.S. was conferred on the following graduates by D. J. McMillen, M.D., D.D.S.:

Wm. M. Bourn	Missouri.
Will A. Boyd	Kansas.
David R. Brockman	Washington.
Elma J. Brockman	Washington.
Frank N. Buck	Kansas.
Elvin T. Douglass	Missouri.
Chas. C. Ehlers	Missouri.
Albert C. Ewart	Canada.
Chas. H. Gillham	Missouri.
John F. Grammer	Texas.
Franklin P. Hair	Missouri.
Henry T. Harvey	Kansas.
F. B. Henderson	Missouri.
C. E. Hereford	Kansas.
T. Russell Hill	Missouri.
Wm. C. Lampe	Kansas.
J. Amos Lovell	Missouri.
Rov W. McDonald	Missouri.
Chas. W. Means	Kansas.
R. H. Merrick	North Dakota.
Victor C. Nelson	Kansas.
John V. Prunty	Texas.
Julian B. Reed	Texas.
Clarence W. Sloan	Missouri.
John W. Smyser	Kansas.
Chas. C. Sterrett	Kansas.
Geo. E. Taylor	Kansas.
August A. Weber	Kansas.
A. L. VanArsdall	Missouri.
Hugh R. West	Kansas.
Herbert J. Wetmore	Kansas.
Jonas C. Whitmer	Missouri.
Edgar P. Yarnell	Missouri.
Henry J. Zeller	Nebraska.

UNIVERSITY OF MARYLAND—DEPARTMENT OF DENTAL SURGERY.

THE annual commencement exercises of the Dental Department of the University of Maryland were held in the Lyceum Theater, Baltimore, Md., on Thursday evening, March 30, 1899.

The address to the graduates was delivered by Rev. Elbert S. Todd, D.D., and the class oration by Linnæus C. Shecut, D.D.S.

The number of matriculates for the session was two hundred and sixteen.

The degree of D.D.S. was conferred on the following graduates by Ferdinand J. S. Gorgas, M.D., D.D.S., dean of the Dental Department:

C. T. Alexander	Georgia.
James H. Baker	North Carolina.
M. C. Boyden	North Carolina.
Charles J. Bragdon	Maine.
A. Broecking	Germany.
P. Du B. Brooker	South Carolina.
Maughs M. Brown	Mississippi.
William S. Brown	Maryland.
Wilbur F. Browne	Maine.
John W. Carlton	North Carolina.
Franklin J. Cline	Virginia.
James R. Copeland	South Carolina.
W. B. Dailey, B.Ph.	Ohio.
Pleasant R. Falls	North Carolina.
T. T. Fauntleroy	Virginia.
W. A. Fillmore	California.
Edward A. Gamard	Louisiana.
F. E. Hammond	New York.
W. F. Hammond	New Hampshire.
Walter E. Hankin	New York.
Asa I. Harris	Virginia.
Harry G. Hawley	New York.
W. C. B. Hoffman	North Carolina.
David G. Hollinger	Pennsylvania.
Arthur N. Hyde	New Jersey.
Herman Igel	Germany.
John N. Johnson	North Carolina.
George S. Johnston	Canada.
Arthur B. Jones	Bermuda, W. I.
James G. King	Virginia.
Alfred J. Kohly	Cuba.
Cyrus Kurtz	Pennsylvania.
W. T. Lineweaver	Virginia.
William L. Logan	Georgia.
Louis M. Lynch	Georgia.
Stewart O. Marshall	Kentucky.
Samuel B. Milford	Virginia.
S. B. Moscovitz	New York.
E. V. McConnell	Georgia.
DeWitt C. McIver	North Carolina.
William R. McLeod	South Carolina.
Benjamin F. Orr	Virginia.
Charles E. Outcalt	West Virginia.
Raiman Petty	New York.
James W. Pitts	South Carolina.
William R. Pond	Vermont.
Warren Price	Maryland.
John A. Roach, Jr.	North Carolina.
Robert J. Scott, Jr.	New York.
Wallace P. Scott	Maine.
William T. Shannon	Georgia.
Linnæus C. Shecut	South Carolina.
Frank E. Smith	New Brunswick.
George C. Smith	Maryland.
Harold B. Smith	New York.
Elmer M. Steele	Virginia.
Harry C. Stover	Pennsylvania.
Mina F. Styne	Virginia.
Tameji Takashima	Japan.
Willard H. Tibbetts	New York.
Herman Tropp	Russia.
Andrew B. Wardlaw	South Carolina.
Leroy M. White	New York.
Joel Whitaker	North Carolina.
William H. Wise	Virginia.

BALTIMORE MEDICAL COLLEGE, DENTAL DEPARTMENT.

The annual commencement exercises of the Dental Department of Baltimore Medical College were held in the Academy of Music, Baltimore, Md., on Thursday afternoon, April 6, 1899.

The Hippocratic oath was administered to the graduates by Charles G. Hill, M.D. The valedictory address was delivered by Rev. E. T. Lawrence, B.A.

The number of matriculates for the session was seventy-three.

The degree of D.D.S. was conferred on the following graduates by Charles G. Hill, M.D., president of the college:

J. H. Ammenheuser	Maryland.
Heber B. Beadle	Connecticut.
Chas. E. Culver	Pennsylvania.
Jas. W. P. Dickison	Canada.
Benj. L. Fisk	New York.
Herman R. Hall	Maine.
Ralph Lange	Maryland.
Emanuel Lehmann	New York.
Robert C. Lewis	Virginia.
John F. Mayock	Pennsylvania.
J. F. Miller	New York.
H. S. Simmons	New Brunswick.
John E. Swallow	Maryland.
Michael H. Toomey	Massachusetts.

MILWAUKEE MEDICAL COLLEGE, DENTAL DEPARTMENT.

The annual commencement exercises of the Dental Department of Milwaukee Medical College were held in the Davidson Theater, Milwaukee, Wis., on Monday, April 3, 1899.

The number of matriculates for the session was one hundred and thirty-five.

The degree of D.D.S. was conferred on the following graduates by G. V. I. Brown, D.D.S., M.D., C.M., dean:

Howard C. Bright	Wisconsin.
Edward W. Bruns	Wisconsin.
Edward J. Conley	Wisconsin.
Ezra R. Cristman	Wisconsin.
James W. Dwyer	Minnesota.
Jas. S. Danforth	Wisconsin.
Stephen C. Durham	Michigan.
John J. S. Freimann	Wisconsin.
Irving H. Fowle	Wisconsin.
Leroy H. Giffen	Wisconsin.
Frank W. Hambach	Wisconsin.
Joseph A. Krainik	Wisconsin.
Conrad H. May	Wisconsin.
John E. Purtell	Wisconsin.
Peter A. Reuter	Wisconsin.
Herman A. Simon	Wisconsin.
Henry F. Strong	Wisconsin.
David H. Thomas	Illinois.
Arthur N. Thompson	Wisconsin.
Chas. M. Vandenburgh	Wisconsin.
George H. Wilde	Illinois.

BALTIMORE COLLEGE OF DENTAL SURGERY.

The fifty-ninth annual commencement exercises of the Baltimore College of Dental Surgery were held in the Lyceum Theater, Baltimore, Md., on Friday evening, March 31, 1899.

The number of matriculates for the session was seventy-two.

The degree of D.D.S. was conferred on the following graduates by Professor M. W. Foster, dean of the college:

F. S. Adams	Kansas.
E. B. Alkire	West Virginia.
W. G. Atkinson	Massachusetts.
C. W. Atterbury	Kansas.
W. W. Barham	California.
W. H. Beach	Maryland.
R. W. Bickford	Maine.
W. H. H. Bixler	Maryland.
G. W. Cheadle	Oregon.
A. E. Cary	Connecticut.
L. D. Coriell	Maryland.
A. J. Cohn	Louisiana.
W. W. Cushman	New Hampshire.
S. J. Craig	Pennsylvania.
G. de Chiara	New York.
M. Douglas	Canada.
A. G. Duncan	Pennsylvania.
C. B. Dickson	Kentucky.
Wm. H. Emmett	Connecticut.
T. O. Flannagan	West Virginia.
S. Frontis	North Carolina.
C. A. Gowans	Utah.
C. E. Gaston	Mississippi.
H. C. Gore	Maryland.
W. E. Gammans	Maine.
A. M. German	New York.
J. E. Gordon	Kentucky.
C. A. Humphreys	New York.
B. Holmboe	Norway.
J. W. Halsell	Texas.
H. H. Johnson	Nova Scotia.
L. A. Johnson	North Carolina.
S. B. Johnston, Jr.	New Jersey.
E. D. Jacobus	New Jersey.
F. H. James	Pennsylvania.
T. D. Kelley, Jr.	Kentucky.
L. R. Lafond	Canada.
F. H. Lambert	Canada.
H. M. Leonard	Canada.
S. P. J. Lee	North Carolina.
R. T. Lakin	Maryland.
A. W. Leard	Canada.
J. S. Lowther	Canada.
G. H. Marven	New Brunswick.
C. S. McArthur	Nova Scotia.
M. G. Munro	Massachusetts.
T. E. McCraith	New York.
A. L. Pendergrass	Arkansas.
D. Payne	Arkansas.
E. G. Price	New York.
P. R. Stillman	New York.
E. B. Sefton	Maryland.
Eva E. Semon	Maryland.
C. J. Sellors	Pennsylvania.
H. L. Smyth	West Virginia.
F. E. Smallwood	Nova Scotia.
C. R. Stewart	West Virginia.
H. H. Streett	Maryland.
J. E. Taylor	South Carolina.
J. P. Taggart	Ohio.
C. L. Woodworth	Maine.
W. N. Weeks	North Carolina.

SOUTHERN MEDICAL COLLEGE, DENTAL DEPARTMENT.

The twelfth annual commencement exercises of the Dental Department of Southern Medical College were held in the Grand Opera House, Atlanta, Ga., on Friday evening, March 31, 1899.

The address to the graduates was delivered by Professor Charles Lane.

The degree of D.D.S. was conferred on the following graduates by Col. N. T. Hammond:

O. J. Bender	North Carolina.
G. L. Brown	Florida.
T. W. Brock	Georgia.
E. L. Crabb	Cuba.
C. F. Crouch	Georgia.
J. B. Donaldson	Georgia.
C. F. Davis	Alabama.
N. Eisenmann	Louisiana.
Love Felton	Georgia.
T. C. Gibson	Georgia.
J. R. Henry	Louisiana.
Clifton Jones	South Carolina.
S. A. Lightfoot	Alabama.
E. E. Lovalace	Georgia.
C. Z. McArthur	Georgia.
C. G. Martin	Mississippi.
C. W. McCalla	Georgia.
B. R. McLaughlin	Georgia.
Wm. McLeod	Georgia.
J. W. McConnell	Georgia.
J. A. Montgomery	Georgia.
A. A. Pfieffer	Alabama.
A. T. Reeves	Alabama.
J. Rogers	Texas.
J. O. Seamans	Georgia.
D. R. Seastrunk	Texas.
D. E. Shackelford	Alabama.
J. L. Ragan	Louisiana.
G. M. Terry	Texas.
T. P. Tison	Georgia.
Virgil Voorhis	Florida.
B. Wildauer	Georgia.

PITTSBURG DENTAL COLLEGE.

The third annual commencement exercises of the Pittsburg Dental College were held in the Alvin Theater, Pittsburg, Pa., on Tuesday afternoon, April 4, 1899.

Addresses were delivered by Rev. J. Crocker White, D.D., and James F. Baldwin, A.M., M.D., of Columbus, O. The address to the graduates was made by Dr. J. G. Templeton, dean of the college.

The number of matriculates for the session was one hundred and ninety-six.

The degree of D.D.S. was conferred on the following graduates by Dr. W. J. Holland, chancellor of the university:

L. E. Ackerson.
P. A. Ambrose.
M. J. Barchfield.
W. C. Butler.
C. R. Blair.
F. L. Crow.
F. N. Cook.
C. B. Dennis.
A. I. DeRoy.
A. Deucker.
W. C. Evans.
C. C. Elliott.
W. D. Fawcett.
Oscar Fausner.
D. J. Griffiths.
E. C. Hawkins.
W. G. Hughes.
T. A. Hogan.
C. S. Horner.
W. J. Holroyde.
J. N. Kramer.
O. M. Kennedy.
R. E. King.
W. B. Lytle.
M. R. Meredith.
W. D. Moore.
L. V. Marquis.
C. L. McChesney.
J. W. McKee.
G. W. McKean.
I. D. Orr.
A. H. Pidgeon.
C. E. Peters.
T. A. Phillips.
S. H. Ralston.
E. J. Roney.
C. C. Rinehart.
J. K. Scott.
H. A. Seitz.
F. A. Schade.
G. L. Stewart.
W. H. South.
C. A. Simpson.
J. T. Smith.
J. R. Titzel.
C. W. Thomas.
W. Throckmorton.
G. A. Urling.
A. E. Wilhelm.
C. E. Whitehead.
E. A. Waugaman.
D. N. Williams.
W. J. Walthour.
B. E. Wright.

NORTHWESTERN UNIVERSITY DENTAL SCHOOL.

The annual commencement exercises of the Northwestern University Dental School were held in the Grand Opera House, Chicago, Ill., on Thursday afternoon, April 6, 1899.

The doctorate address was delivered by Alton H. Thompson, D.D.S., the salutatory by Thomas Reid, D.D.S., and the valedictory by Loran P. Akers, D.D.S.

The number of matriculates for the session was five hundred and eighty-seven.

The degree of D.D.S. was conferred on the following graduates by Henry W. Rogers, LL.D., president of the university:

Francis D. Arter	Illinois.
Thos. W. Axtell	Iowa.
Loran P. Akers	Illinois.
W. H. Albright	South Dakota.
F. S. Anable	Minnesota.
Sylvester W. Arthur	Iowa.
George M. Brosnihan	Illinois.
Wm. H. Baker	England.
Arthur H. Brown	Illinois.
Chris. Bostlemann	Illinois.
Leslie O. Barnard	Iowa.
Louis Bloon	Illinois.
Walter C. Barber	Illinois.
Howard T. Bond	Illinois.
Roscoe S. Bayne	Illinois.
Irving C. Bronson	Iowa.
L. St. Clair Bugbee	Wisconsin.
Wyland C. Bradshaw	Iowa.
Carl H. Brown	Illinois.
William H. Barth	Wisconsin.
William E. Bartels	Wisconsin.
Harry B. Bishopp	Illinois.
James H. Calder	Iowa.
Robert L. Cosner	Nebraska.
Albert S. Cork	Illinois.
Walter DeW. Cornell	Illinois.
Frank E. Carmichael	Nebraska.
Herbert M. Craig	Pennsylvania.
Henry L. Chilson	Wisconsin.
C. C. Castle	Illinois.
Chas. B. Campbell	Illinois.
A. E. Childs	Iowa.
Cara E. Duth	Illinois.
George L. Dent	Illinois.
Leroy Dellibac	Illinois.
Lewis C. Dow	Indiana.
A. C. Davidson	Iowa.
Claude W. Dodge	Nebraska.
Wells Dewell	Iowa.
Allen A. Doughty	Iowa.
Armin J. Dieckmann	Michigan.
Joseph W. Dunning	Washington.
Howard G. Davis	Illinois.
Gail B. Elliott	Illinois.
F. F. Ehlers	Iowa.
A. R. Ebenreiter	Wisconsin.
Arch E. Ely	Missouri.
Herman G. Eakins	Michigan.
Maria T. Foster	Wisconsin.
James E. Forsyth	Australia.
John S. French	North Dakota.
Walter P. Flynn	Nebraska.
Frank T. Graham	Nebraska.
Oren E. Ganoe	Iowa.
Frank T. Gerecke	Nevada.
Fred W. Gethro	Illinois.
Barney F. Greenhow	Illinois.
F. R. Grigsby	Illinois.
Edward A. Gibbon	Iowa.
Ralph S. Graham	Illinois.
Albert O. Haviland	Kansas.
H. E. Harrison	Missouri.
John A. Huff	Illinois.
Wm. R. Hepburn	Wisconsin.
Max R. Harvey	Wisconsin.
William S. Hicks	Illinois.
Herbert G. Haesller	Iowa.
Henry F. Helms	Iowa.
H. J. Hemminger	Indiana.
Ralph Y. Hunt	Washington.
D. D. Hallenbeck	Illinois.
Ralph Hepler	Illinois.
Oliver Harstad	Iowa.
A. J. Hodges	Oregon.
Chas. W. Hickman	Illinois.
Robt. W. Johnson	Michigan.
Ane M. Jorgensen	Wisconsin.
Richard R. Johnson	North Dakota.
Burton C. Johnson	Illinois.
James M. Jones	Louisiana.
Israel S. Kirkwood	Illinois.
Birdine King	California.
John B. Kalusner	Nebraska.
Edward Kramm	Illinois.
John C. Kinney	Illinois.
Wm. O. King	Wisconsin.
Walter P. Kountz	Pennsylvania.
Fred Kestley	Wisconsin.
Paul P. Lucke	Iowa.
Emory M. Lotts	Iowa.
Arthur C. La Touche	Illinois.
Stephen A. Lyon	Kansas.
Martin J. Linderholm	Illinois.
Emil R. Luebbert	California.
Glenn L. Merritt	Iowa.
Jean Moyer	Illinois.
Wm. I. Maddock	Illinois.
Joseph E. Miner	Illinois.

John C. Meng	Wisconsin.
Nicholas J. Maun	Nebraska.
Samuel A. Marlow	Wisconsin.
Harry D. Manger	Minnesota.
Henry A. Meyer	Oregon.
N. B. W. McCartney	Illinois.
Ernest F. McCartney	Iowa.
James H. McKay	Iowa.
Wm. C. McWhethy	Illinois.
Oscar C. Nylund	Sweden.
Sylvia M. F. Napper	Illinois.
Chas. L. Nitchelm	Illinois.
Wm. R. Neff	Illinois.
David M. Olkon	Russia.
Burt T. Osher	South Dakota.
Bertram Older	Wisconsin.
Chas. A. Petre	Illinois.
John S. Pennington	Iowa.
R. K. Pinkerton	Illinois.
Fred. W. Parker	Illinois.
Harry E. Pike	Illinois.
Henry V. Pfaff	Missouri.
Harry E. Pier	Wisconsin.
Walter J. Petrie	Illinois.
Wm. J. Prideaux	———
Frank S. Potts	Wisconsin.
Albert B. Potter	Kansas.
Chas. J. Reinfried	Iowa.
Thomas Reid	Scotland.
Jas. A. Robertson	South Dakota.
Chas. F. Rounseville	Illinois.
H. C. Rodenhouse	Illinois.
Frank M. Reed	Illinois.
Clair W. Roberts	Iowa.
Geo. A. Ryder	Iowa.
Augustus M. Rowan	Wisconsin.
Lawrence F. Ray	Michigan.
Priscilla H. Stansell	Ohio.
Ada P. Swain	Iowa.
Ernest S. Sprenger	Wisconsin.
Burleigh M. Smith	Iowa.
Ira B. Sellery	Ontario.
Arthur Selvsberg	Iowa.
David A. Smalley	Illinois.
F. W. Simmonds	Iowa.
Harry I. Swigert	Illinois.
Wm. O. Talbot	Mississippi.
Reuben C. Traynham	Texas.
David J. Thorp	Missouri.
Geo. D. Upson	Illinois.
Wm. E. Underwood	Wisconsin.
H. N. Van Denbergh	Michigan.
Anthony J. Williams	Wisconsin.
Chas. E. Winter	Illinois.
Nicholas P. Weber	Iowa.
Eugene S. Willard	Alaska.
Ernest I. Waldberg	Illinois.
Frances M. Walsh	Illinois.
Chas. F. Wadsworth	Illinois.
Frank M. Welch	Indiana.
David J. Wright	Manitoba.
Samuel A. Wright	Minnesota.
Chas. A. Walton	Illinois.
Macomb L. Wright	Iowa.
Ernest H. Wilson	South Dakota.
S. W. Zipperman	Russia.

BIRMINGHAM DENTAL COLLEGE.

The annual commencement exercises of the Birmingham Dental College were held in O'Brien's Opera House, Birmingham, Ala., on March 31, 1899, at 8.30 P.M.

The address to the graduating class was delivered by Hon. Joseph H. Merrill, of Thomasville, Ga.

The number of matriculates for the session was forty-two.

The degree of D.D.S. was conferred upon the following graduates by T. M. Allen, D.D.S., dean:

W. D. Carmichael	Wisconsin.
J. S. Daniel	Alabama.
R. S. Hunt	Alabama.
W. H. Marsh	Alabama.
B. M. Ohine	Florida.
J. W. Ried	Alabama.
Ira Williamson	Mississippi.

CHICAGO COLLEGE OF DENTAL SURGERY.

The seventeenth annual commencement exercises of the Chicago College of Dental Surgery (Dental Department of Lake Forest University) were held in Central Music Hall, Chicago, Ill., on Wednesday afternoon, April 5, 1899.

Addresses were delivered by Dr. John H. Finley, president of Knox College; Lewis Stewart, M.A., Ph.D., of Lake Forest University, and Rev. Wm. M. Lawrence, D.D.

The class valedictory was delivered by John P. Luthringer, D.D.S.

The number of matriculates for the session was five hundred and seven.

The degree of D.D.S. was conferred on the following graduates by Truman W. Brophy, M.D., D.D.S., LL.D., president of the college:

Emil A. Ableiter.
Lewis J. Andrews.
Fred C. Angle.
Amos E. Adsit.
H. W. Boon.
I. A. Burnett.
John Bohr.
Rudolph Beck.
Roy G. Booth.
Albert J. Buchheit.
Otto Baumrucker.
Geo. E. Bratten.
John H. Burton.
Silas A. Beason.
A. E. Bartholomew.
Geo. B. Brown.
S. A. Brady.
Geo. P. Brenner.
C. L. Bartholomew.
F. E. Blakeslee.
Geo. H. Bomer.
Edw. G. Burgman.
Holmes G. Brown.
Orville L. Bates.
Edgar S. Barnes.
Clark M. Cuthbert.
William A. Cox.
Edgar D. Chandler.
Homer L. Cheever.
Carl B. Case.
Elbert H. Cornwell.
Wm. L. Colyer.
Oscar J. Cunningham.
Geo. W. Diepenbrock.
Wm. Dorfner.
Glenn S. Dolson.
Peter T. Diamond.
Abraham Drosdowitz.
E. G. Dundass.
Mell M. Everett.
Griffith D. Evans.
James W. Ewin.
John English, Jr.
A. J. England.
H. M. Ferguson.
Emery L. Fincham.
Bruno W. Fick.
Lemuel P. Fry.
David W. Fithian.
Conrad H. Forster.
Howard Frace.
C. A. Flemming.
W. G. Fortune.
James M. Gardner.
Edwin J. Greenfield.
Fred. A. Gray.
Will M. Gabriel.
W. P. Gasser.
Warren A. Gamble.
Chas. E. Gerretson.
Edgar L. Gausby.
J. J. Gillane.
Joseph W. Hardin.
Frank S. Hanscomb.
Fred. L. Hamil.
Frank J. Haessler.
Ralph E. Hayden.
Frederick Hewetson.
Robert C. Horner.
Wilfred P. Harvev.
Edw. J. Hanan.
Fred. E. Hall.
Nazareth S. Haradjian.
Paul H. Harlan.
Harry C. Higgins.
James L. Hamilton.
Elton E. Hankins.
F. H. Helt.
H. H. Herren.
Otto Holinger.
Virgil Hoffer.
Chas. E. Hirth.
John C. Hothan.
Thos. H. Harris.
Alexander Ivey, Jr.
John E. Isely.
Geo. T. Jones.
Edw. E. Johnson.
John A. Kaufer.
Conrad G. Kinstad.
Geo. W. Kerner.
Frank J. Kuehn.
J. P. Luthringer.
L. B. Lindeboom.
Walter M. Long.
Oscar A. Laughlin.
William Luxmore.
Eric Lindholm.
Geo. R. Lanning.
Edwin H. McTaggart.
R. D. McKean.
Richard J. McClevy.
Irvin E. McVay.
Hugh J. MacKechnie.
Richard D. Moran.
Fred. B. Moorehead.
John McPhee.
James M. Manton.
George Massart.
Louis H. Maas.
Albert E. Morey.
Manly H. Michaelis.
Geo. W. Nevins.
Richard E. Nixon.
Carl J. Nielson.
Emmett M. O'Keefe.
John Orth.
William C. Penrose.
C. G. Pomainville.
John H. Pierce.
Malcolm Pounder.
Fred. A. Richards.
Edw. L. Ritzenthaler.
Geo. M. Ruttan.
Robert M. Riggs.
Benj. F. Redman.
Wm. H. Roth.
Alfred E. Rocke.
G. A. Russell.
Harry E. Stevenson.
Truman Shattuck.
Clem. E. Shidler.
Walter R. Stokes.
C. A. Spellman.
Harry J. Smith.
Harry D. Shaw.
John J. Seidscheck.
Richard A. Smith.
Alva L. Spindler.
Edward H. Steel.
David L. Stanton.
Allison Smith.
Geo. Schneider.
Walter R. Schell.
G. W. Torrey, M.D.
Berna S. Tyler.
Edw. S. Wingren.
Dudley Welch.
Chas. A. Wood.
B. Williamson.
Wm. E. Weis.
James A. Wells.
J. F. F. Waltz.
John C. Warnock.
C. W. Wolfenberger.
Wm. S. Walters.
Chas. A. Wayde.
Philip J. Wendel.
P. M. Wuillemin.
S. I. Williams.
Thos. J. Wilson.
H. E. Walsh.
John A. Zartzin.

VANDERBILT UNIVERSITY, DEPARTMENT OF DENTISTRY.

The twentieth annual commencement exercises of the Dental Department of Vanderbilt University were held in the Theater Vendome, Nashville, Tenn., on Thursday, March 30, 1899.

The address to the graduates was delivered by Rev. James I. Vance.

The number of matriculates for the session was one hundred and sixty-five.

The degree of D.D.S. was conferred on the following graduates by Vice-Chancellor Rev. W. F. Tillett:

F. L. Bethancourt	Louisiana.
C. F. Boyer	Mississippi.
J. J. Boyd	Tennessee.
H. G. Bow	Kentucky.
L. B. Duncan	Kentucky.
J. L. Dunn	Alabama.
W. W. Ezelle	Alabama.
J. H. Elliott	Texas.
J. R. Eleazer	Tennessee.
W. M. Fariss	Tennessee.
J. E. Frazer	Alabama.
J. L. Griffin	Kentucky.
Will Gillispie	Tennessee.
H. T. Gill	Kentucky.
R. K. Harris	Texas.
O. L. Harkey	Tennessee.
H. F. Hamil	Alabama.
A. M. Haas	Louisiana.
R. Inge	Alabama.
J. C. Johnson	Tennessee.
J. R. Johnston	Alabama.
E. E. Kaiser	Tennessee.
G. Montgomery	Tennessee.
M. McNeely	Tennessee.
Chas. McKennon	Arkansas.
Jas. A. Moore	Tennessee.
L. B. Price	Alabama.
J. D. Poindexter	Alabama.
L. J. Ramage	Alabama.
E. Riviere	Georgia.
G. W. Reynolds	Arkansas.
Alex. Sledge	Alabama.
W. P. Sims	Tennessee.
H. B. Smith	Alabama.
J. W. Thompson	Tennessee.
E. D. Tilford	Kentucky.
M. Theriot	Louisiana.
C. A. Tavel	Tennessee.
F. L. Whitman	Alabama.
A. A. Wheat	Alabama.

UNIVERSITY OF TENNESSEE, DENTAL DEPARTMENT.

The annual commencement exercises of the Dental Department of the University of Tennessee were held in Nashville, Tenn., on Tuesday, March 28, 1899.

The charge to the graduates was delivered by Professor John H. De Witt, A.B., LL.B., and the valedictory by F. A. Blanchard, D.D.S.

The number of matriculates for the session was one hundred and four.

The degree of D.D.S. was conferred on the following graduates by Charles W. Dabney, Ph.D., LL.D., president of the university:

W. H. Bailey	Tennessee.
Robt. M. Black	Mississippi.
F. A. Blanchard	Louisiana.
Marion A. Bryant	Tennessee.
W. M. Chambliss	Mississippi.
Herbert R. Clark	Tennessee.
D. B. Dawson	Tennessee.
Jas. W. Dennis	Arkansas.
C. B. Fowlkes	Tennessee.
A. W. Gould	Tennessee.
E. P. Gould	Tennessee.
O. L. Gould	Tennessee.
E. R. Hart	Missouri.
Alex. H. Jackman	Kentucky.
W. A. James	Mississippi.
S. R. Jones	Tennessee.
Wm. C. King	Tennessee.
Ernest A. Long	Arkansas.
J. H. McLean	North Carolina.
Edgar W. Moose	North Carolina.
R. A. Nicholson	Mississippi.
John C. Parr	Tennessee.
J. A. Pelky	California.
J. B. Risenhoover	Kentucky.
J. A. Rule	Michigan.
Baxter C. Scott	Mississippi.
J. L. Ward, M.D.	Tennessee.
C. L. White	Virginia.

MEHARRY MEDICAL COLLEGE, DENTAL DEPARTMENT.

THE thirteenth annual commencement exercises of the Dental Department of Meharry Medical College (Central Tennessee College) were held in the Gospel Tabernacle, Nashville, Tenn., on Wednesday evening, February 1, 1899.

The degree of D.D.S. was conferred on the following graduates by Rev. J. Braden, D.D., president of the college: T. Jay McAllister, St. Louis, Mo.; Joseph E. Willis, New Orleans, La.

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DENTAL SOCIETY ANNOUNCEMENTS.

MICHIGAN DENTAL ASSOCIATION.

THE next annual meeting of the Michigan Dental Association will be held in the parlors of the Hotel Harrington, Port Huron, Mich., July 11, 12, and 13, 1899. A cordial invitation is extended to all members of the profession.

M. B. DENNIS, *Secretary.*

KENTUCKY STATE DENTAL ASSOCIATION.

THE twenty-ninth annual meeting of the Kentucky State Dental Association will be held at Mammoth Cave, Ky., May 16, 17, and 18, 1899. A cordial invitation is extended to all members of the profession to be present. For information address

J. H. BALDWIN, *Secretary,*
307 West Broadway,
Louisville, Ky.

SOUTH DAKOTA STATE DENTAL SOCIETY.

THE seventeenth annual meeting of the South Dakota State Dental Society will be held in Yankton, beginning Wednesday, June 7, 1899, and continuing three days.

C. L. BLUNT, *Secretary.*

UNION MEETING IN WASHINGTON.

THE third tri-union meeting of the District of Columbia Dental Society, the Maryland State Dental Association, and the Virginia State Dental Association, will convene in Washington, D. C., June 7, 8, and 9, 1899, in the Washington Dental College, 625 Massachusetts avenue. Eminent practitioners from many states will be present to clinic and read papers. The profession cordially invited.

JNO. H. LONDON, *Chairman Joint Ex. Committee,*
1115 G street, N. W., Washington, D. C.

PENNSYLVANIA BOARD OF DENTAL EXAMINERS.

THE examinations by the Pennsylvania State Board will begin on Tuesday, June 20, 1899, at 9 A.M., continuing to June 24 inclusive, and will be held at the University of Pennsylvania.

ROBERT HUEY, *Secretary pro tem.*

DENTAL SOCIETY OF THE STATE OF NEW YORK.

THE thirty-first annual meeting of the above society will be held in Albany May 10 and 11, 1899, and the following program will be presented: President's address; report of correspondent, R. Ottolengui, M.D.S.; report of committee on practice, L. C. LeRoy, D.D.S.; essays by L. D. Shepard, M.D., D.D.S., Boston, Mass.; R. M. Sanger, D.D.S., East Orange, N. J.; Wm. Hailes, Jr., M.D., Albany; A. Retter, D.D.S., Utica.

A cordial invitation is extended to all reputable dentists to attend the meeting.

F. LE GRAND AMES, *President*,
CHARLES S. BUTLER, *Secretary*,
680 Main st., Buffalo, N. Y.

TEXAS STATE DENTAL ASSOCIATION.

THE nineteenth annual session of the Texas Dental Association will be held at Waco, Texas, the 16th, 17th, and 18th of May, 1899. By the cooperation of the Texas State Pharmaceutical Association, which meets at the same time and place, we have secured the following named trip rates: From points seventy-five miles and under, one and one-third fares. Points seventy-five to one hundred miles, $3. Points over one hundred miles, half rate. The profession cordially invited.

M. S. MERCHANT, *President*.
J. G. FIFE, *Secretary*.

ILLINOIS STATE BOARD OF DENTAL EXAMINERS.

THE next regular meeting of the Illinois State Board of Dental Examiners will be held on May 13, 1899, at the Chicago Business College, No. 67 Wabash avenue, Chicago, Ill. Those desiring to take the examination should notify the secretary before the date of meeting.

J. H. SMYSER, *Secretary*,
70 State street, Chicago, Ill.

DENTAL COMMISSIONERS OF CONNECTICUT.

THE Dental Commissioners of Connecticut will meet in the Supreme Court rooms at the capitol in Hartford, Monday, May 15, 1899, at 10 o'clock, to examine candidates for license and attend to all matters proper to come before them. Persons desiring to practice in this state must apply to the recorder for proper blanks, which they will fill out and return to him before the day of examination.

GEORGE L. PARMELE,
Dental Commissioner and Recorder.

NATIONAL DENTAL ASSOCIATION—SECTION VI.

CONTRIBUTIONS upon the etiology of dental diseases and abnormalities, and dental physiology, are requested for the National meeting at Niagara in August. Send such articles to L. E. Custer, secretary, Dayton, Ohio, or to J. D. Patterson, chairman, Kansas City, Mo.

AMERICAN DENTAL SOCIETY OF EUROPE—ACTION ON AMERICAN DIPLOMAS.

UPON motion, the following report of the committee appointed by the American Dental Society of Europe in London, August, 1898, was carried unanimously:

"WHEREAS, A special executive session of the American Dental Society of Europe has been called at Brussels, April 1, 1899, for the purpose of considering what further action shall be taken toward improving the standing of the graduates from American dental colleges practicing in Europe and to receive and act upon the report of the committee appointed in London at the last annual meeting:

"WHEREAS, A majority of said committee and a large number of the active members of the society being present from all parts of Europe, thereby showing their great interest in the subject under consideration;

"*Resolved*, That the American Dental Society of Europe views with pleasure and approval the action of the National Association of Dental Faculties, U. S. A., in appointing a 'Foreign Relations Committee,' and hopes that this committee will be indefinitely continued, and empowered to take such action as shall appear to its members to be for the best interests of the profession.

"*Resolved*, That the society expresses its thanks to the National Association of Dental Faculties, for its resolution and action in accepting the report of its 'Foreign Relations Committee,' and continuing it at Omaha, August, 1898, and creating advisory boards in all European countries, with the view that the certificates of foreign students proposing to enter American dental colleges be submitted to the advisory boards of the respective countries of which they are citizens or residents.

"*Resolved*, That it is the opinion of this society that foreign students should possess such a knowledge of the English language as will enable them to thoroughly comprehend the lectures and teachings which they will be called upon to pass examinations in, and that no foreign student should be allowed to pass any examination through the medium of an interpreter.

"*Resolved*, That the American Dental Society of Europe heartily approves of the wisdom of requiring a preliminary examination of students from European countries, or would suggest as preferable that it be required of each foreign student that he present official certificates of having passed the preliminary requirements for matriculation as a dental student in his own country, and that these certificates be indorsed by the advisory board of said country, and that they also be subject to the rules of the National Association of Dental Faculties.

"*Resolved*, That this society approves of the resolution of the 'Foreign Relations Committee,' of the National Association of Dental Faculties, to appoint advisory boards consisting of 'not more than three members,' and it is hoped, for the accomplishment of the best results, that the number of members on each board be raised to three at the earliest practical moment, and this society is unanimously and strongly of the opinion, that three are necessary to constitute an influential board of this nature; and that, where practicable, at least one member should be a native of the country.

"*Resolved*, That the American Dental Society of Europe tender a sincere vote of thanks to the National Association of Dental Faculties, and to the

'Foreign Relations Committee,' and especially to their energetic chairman, Dr. W. C. Barrett, for the active and hearty manner in which they have met the appeals of their confrères in Europe, who for so long have urged the importance of the consideration this subject is now receiving at their hands.

"*Resolved,* That a Committee upon Dental Education be a permanent committee of the society, and that said committee consist of all the members of the society who are members of the advisory board of the 'Foreign Relations Committee' of the National Association of Dental Faculties."

(Signed) L. C. Bryan, *Chairman,*
W. E. Royce,
W. Mitchell.

It was further moved and carried: "That the report of the committee be sent to the various dental journals for publication at the earliest possible date."

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EDITORIAL.

MUMMIFICATION OF THE DENTAL PULP.

Much of the success attained by modern methods of dental practice is directly the result of the degree of perfection that has been reached in the treatment of pulpless teeth. In fact, were it not for the possibility of saving that class of teeth in a condition of usefulness and comfort, not only would these be lost, but the elaborate systems of crown- and bridge-work which owe their existence primarily to the salvability of pulpless teeth would have been unknown to-day. Hence the importance which attaches to methods of pulp-canal treatment and the intense activity of interest expended upon this subject in all directions.

The devices which have been tried in pulp-canal treatment are innumerable, but out of the chaotic mass of crude experimentation certain fundamental principles have been evolved which are factors *sine qua non* in the process. Especially has it been established that no method can be successful that does not practically deal with the factor of bacterial infection and relate it in proper order with the associated procedures in canal treatment. It is the bacterial factor which is at the foundation of all pulp-canal treatment, and successful methods are but intelligent applications of antisepsis to the several conditions to be met.

The purpose of this communication is to direct attention to two essentially different modes of dealing with pulp-canals and their contents, in which the difference is so great that a discussion of their relative merits seems pertinent at this time.

One method is based upon the conception that all pulp-tissue and organic matter should be removed from the root-canals as a prerequisite of success, the other that the pulp-tissue may by chemical means be so altered as to resist infection by bacteria and so remain inert.

The success of the first is based upon theoretically correct principles which practice has demonstrated to be true. An environment devoid of pabulum cannot support bacterial life, therefore complete removal of organic matter from the canals and tubules of a tooth renders the territory uninhabitable, hence putrefactive processes with their irritative sequelæ are thus prevented. Practice has fully demonstrated the fact that an aseptic root-canal absolutely filled gives no subsequent trouble to patient or operator. The ideal conditions for the application of this principle are, however, not always attainable. Mechanical difficulties of position, small and tortuous canals, inaccessibility, abnormal shapes of canals, etc., are practical obstacles to the complete mechanical removal of the dead pulp-tissue, hence have arisen various methods based upon the second principle alluded to, of converting the pulp into an unalterable inert mass by chemical means and allowing it to remain *in situ* as a canal filling.

There can be no doubt that this method is based upon correct principles if it can be shown that the chemical treatment of the pulp will permanently prevent its decomposition, a factor which in practice remains as yet to be proven.

There are strong analogies between the recently proposed methods of pulp-mummification and the results of the earlier operations in pulp-capping by oxychlorid of zinc, so far as their chemical features are concerned. Before the properties of zinc chlorid were clearly understood in relation to the tissues of the dental pulp, many successful (?) cases of pulp-capping were found to be ultimately cases of successful pulp-destruction. It became a notorious fact that an exposed pulp capped directly with oxychlorid of zinc after a period of some disquietude eventually became comfortable and remained so until perhaps years afterward, when the operator, having occasion to renew the filling, found to his surprise an empty pulp-chamber beneath his capping instead of a vital pulp, as he had expected from the fact that no acute disturbance had followed the original operation. Destruction of the pulp by oxychlorid of zinc directly applied is probably the general consequence of such practice. Subsequent pericemental disturbance is usually absent because of the antiseptic properties of the capping preventing the ingress of putrefactive germs. The analogy is somewhat closer when it is remembered that the coagulum of zinc chlorid and animal tissue or albuminous matter is dense and leather-like, and when not plentifully saturated with moisture remains unattacked by micro-organisms indefinitely, provided no great excess of zinc chlorid is present beyond the amount required to produce the coagulum. Pulps *in situ* treated with zinc oxychlorid in most cases disintegrate after a certain period, leaving the canals empty, after which infection may take place.

It is probable that the various mummifying processes gaining in vogue at the present time are of more definite value and greater permanence than the results of treatment by oxychlorid of zinc, but all are chemically analogous, and the differences in result are of degree rather than kind, for each and all of them depend upon a chemical tanning or coagulation of the animal tissue, converting it into a more or less unalterable compound. The practical test of experience and time alone can determine the value and utility of this class of operations as of all others.

An important feature in relation to the general introduction of mummifying methods of pulp-treatment should not be lost sight of,—viz, the tendency to their careless and indiscriminate use and to encourage slovenly and imperfect operations.

It is far less difficult to seal a pellet of mummifying paste into a cavity, complete the operation at a short single sitting, and collect the fee upon its completion than it is to do a thorough canal operation, and the very ease which this short cut through an essentially difficult operation to the fee for it confers is a dangerous temptation to degrade the high standard of dental work which should always be maintained. Unless it can be shown that the mummifying method is something more than a deceptive device for postponing the eventual development of apical disturbances due to ultimate failure of the protective character of chemical applications to the pulp, it should be undertaken with extreme caution until the records of its successful use have carried it beyond the purely experimental stage.

The view here presented is not intended to be condemnatory of the methods under consideration, nor of the principle upon which they are based, but merely as cautionary against a general adoption of them as methods of routine practice at this stage of their history.

The mummifying method is a direct exponent of the difficulties in the way of the older methods of canal treatment based upon the principle of complete mechanical removal of the organic canal contents. It has been claimed by some operators that no pulp-canal presents insurmountable obstacles to complete mechanical cleansing. While we are willing to admit for the sake of the argument that the claim may be true for those that make it, there is no question that many cases of canal treatment occur which are beyond the ability of operators of more than average skill to successfully cleanse and fill by strictly mechanical means. Hence the necessity of some method by which the average practitioner can deal successfully with this class of cases.

Attention of the profession has been directed to another series of methods for canal treatment which have for their object the complete removal of organic matter, not by mechanical but by chemical means, and which apparently have not received the general attention to which their merits entitle them.

Reference is here made to the Callahan sulfuric acid method, the Schreier method, and the sodium dioxid method. The basal principle in each of these is the same,—viz, the solvent action of a chemical substance upon the canal contents whereby they may be dissolved and washed out. Sterilization is effected at the same time by the chemicals used, and the canals may be filled with a fluid of low melting point and one indestructible in the position in which it is placed.

A technique involving the principles noted leaves but little to be desired, is of general applicability, and is in accord with the lines which experience has heretofore shown to be those which insure success.

We believe that further study will ultimately demonstrate the superiority of these pulp-dissolving methods over the devices which permit any portion of the organic matter to remain even when guarded by the coagulating and preserving effect of the best agents at present known for that purpose.

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HYGIÈNE ET THÉRAPEUTIQUE DES MALADIES DE LA BOUCHE. By Dr. CRUET, ancien interne des hôpitaux de Paris. Preface par le Professor Lannelongue. Paris, Masson et Cie., Editeurs, 1899.

This is one of a series of volumes published as the Bibliothèque D'Hygiène Thérapeutique, under the direction of Professor Proust, dealing with the relations of hygiene to various disease conditions. The volume in question, as its title indicates, is concerned with the hygiene and therapy of the oral cavity and its contained organs.

Works of this character are, of course, not intended to take the place of larger and more comprehensive works, from which standpoint they are necessarily inadequate. Judged by the standard of its avowed purpose, which is the only standard by which a work can fairly be judged at all, the present volume is an admirable presentation of the subject. It is sufficiently full in treatment to furnish the lay reader or student with reliable information upon about all of the mouth conditions with which he need be made familiar.

Many works of this character, in the effort to be concise, are meager in the amount of information given, and are oftentimes misleading because of their defect in that particular. Dr. Cruet's work is not of that class; it fairly covers the ground, and does it well. It meets the purpose for which it was written as well as any work of the kind with which we are familiar.

OBITUARY.

DR. T. G. LUTHER.

Dr. T. G. Luther died at his home, Ripon, Wis., March 6, 1899, after having been in feeble health for several months in consequence of a stroke of paralysis from which he suffered during last summer. He was in his seventy-fourth year, having been born at Plainfield, N. H., July 20, 1825. He studied dentistry in Boston, and in 1855 went West, and for three years practiced his profession in Illinois. Three years later he removed to Ripon, Wis., where he resided during the rest of his life.

Dr. Luther was married in 1861 to Emma Phelps, who survives him. Their only son, F. D. Luther, is in commercial life in Chicago. Dr. Luther was held in high esteem by his fellow-citizens. He had been a Mason for forty-five years.

HINTS, QUERIES, AND COMMENTS.

To the Editor of the Dental Cosmos:

Sir,—In an article on "The Federal Government and the Public Health," published in the *North American Review*, May, 1898, Alvah H. Doty, M.D., health officer of the port of New York, says, "We have now indisputable evidence of the destructive power of steam and other disinfectants upon the pathogenic organisms (organisms or germs which cause infectious disease), and apparatus for the practical application of these agents has been perfected." In another article Dr. Doty also speaks of the manufacture of new and improved apparatus for disinfection with steam, formaldehyd gas, etc.

While boiling, even when disinfectants are used, cannot be relied on for destroying all forms of germ life, on the other hand it has been conclusively demonstrated that steam without the use of disinfectants will most effectively destroy organisms which cause infectious disease. For steaming dental instruments and napkins, thereby more thoroughly sterilizing than by simply boiling them, the ordinary dental vulcanizer furnishes a simple and effective sterilizer.

Place the instruments in cotton or linen bag tied closely at the top, put in the vulcanizer, and run the thermometer up to 230°. Shut off the gas, and allow the instruments to remain in the steam bath for ten minutes. A small quantity of bicarbonate of soda placed in the water will prevent the instruments from rusting. Any vulcanizer holding three flasks will admit the forceps, which of all dental instruments should be thoroughly sterilized.

KASSON C. GIBSON.

NEW YORK, N. Y.

FREE DENTAL DISPENSARIES.—The Bureau of Associated Charities has arranged to open dental dispensaries in each of its ten district offices for the exclusive use of the poor. The details of the plan were announced by Superintendent Bicknell at the meeting of the Board of Directors yesterday. Dr. Theodore Gramm is in charge of the movement, and a dozen or more prominent dentists have become interested in the work.—*Chicago Post*, March 29, 1899.

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A MONTHLY BIBLIOGRAPHY OF DENTAL LITERATURE.

COMPILED BY J. MELVIN LAMB, M.D., D.D.S., WASHINGTON, D. C.

The abbreviations of titles used are those common to bibliographical work, and will, it is presumed, be readily comprehended by any one familiar with dental or scientific publications. Any explanation will be gladly furnished by the compiler. A star (*) indicates a thesis.

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LIST OF UNITED STATES PATENTS

PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING MARCH, 1899.

March 14.—No. 621,154, to Frederick F. Scholl. Dental engine.
" *21.*—No. 621,686, to Edw. H. Lyon. Powder box.
" *28.*—No. 621,873, to Wilhelm Vajna. Dental nerve-broach.
" " No. 621,987, to Geo. E. Zinn. Dental disk-holder.
" " No. 622,068, to Clyde S. Payne. Mold for and method of making tooth-crowns.
" " No. 30,443 (Design) to Frederick F. Scholl. Locking bar and handle for vulcanizer.

THE

DENTAL COSMOS.

VOL. XLI. PHILADELPHIA, JUNE, 1899. No. 6.

ORIGINAL COMMUNICATIONS.

PROSTHESIS OF THE INFERIOR MAXILLA.

BY DR. NAAMAN H. KEYSER, GERMANTOWN, PA.

(Read before the Pennsylvania Association of Dental Surgeons, January 10, 1899.)

MRS. L. G., the patient for whom this operation was performed, relates the following history: She had, when about twenty-one years of age, a severe attack of scarlet fever, from which she recovered but slowly. While still feeling the effect of this illness she was playfully kicked on the chin by an infant she was fondling. It is presumed that this apparently trifling incident was the immediate cause of her serious misfortune.

Shortly after the accident she noticed a swelling on the lower jaw, which gradually increased, and on seeking medical advice it was pronounced to arise from necrosis. The first operation was performed when she was about twenty-four years of age, when an attempt was made to arrest the disease by scraping or cutting away the necrosed portion of the lower maxilla. The relief was only temporary; in about a year's time the operation was repeated, and a larger portion of the inferior maxilla was removed. This proved ineffective. A year later the remaining portion was disarticulated on each side, completely removing the entire bone. So far as is known, the only thought was to relieve the patient of the distressing disease, the most pressing need in her then physical condition. A case of this kind occurring to one whose system is enfeebled by disease differs very materially from one where the injury to the bone is received while the patient is in a perfect physical condition. The future welfare of the patient, so far as making provision for prosthetic replacement of the lost maxilla, was either overlooked or deemed inadvisable under the then existing conditions.

The operation was performed by cutting down the median line of the lower lip, and then backward along the lower edge of the body of the bone toward the ramus on each side so as to reach the articulation. The bone was then dissected from the soft tissues and bodily removed. So extensive was the disease it was not deemed prudent to attempt to save any part of the bone or periosteum.

The patient made a good recovery, and her general health quickly improved. So great, however, was the contraction of the parts, due to the extensive loss of tissue, that a number of dentists whom she consulted, both private practitioners and others at the dental college clinics, considered any attempt at prosthetic replacement well-nigh impossible. The outlook was indeed discouraging. There was no resting place for any artificial appliance, while the bands of rigid cicatricial tissue resisted the pressure necessary to distend the muscular tissue so as to restore the contour of the chin and adjacent parts. She was indeed in a pitiable condition, for in addition to the very pronounced distortion of the face, as seen in Fig. 1, she was not able to articulate, her speech being so defective that only those she constantly associated with were able to understand her. Her case coming to the notice of the late Dr. Bernard Herz, I was asked by him to see her in consultation to determine the possibility of making some mechanical arrangement that would at least lessen the deformity and assist articulation.

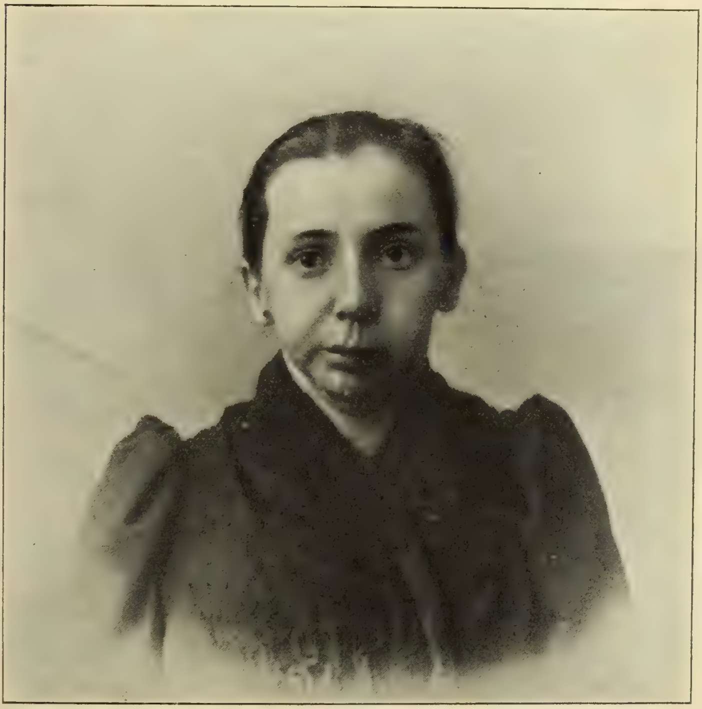
The patient possessed a remarkably good set of upper teeth, and the thought was that these could be used to retain a prosthetic appliance. The lower muscles were so drawn that when the mouth was opened the bed of the mouth slanted from the lips down the throat. As a first step, an impression was taken in plaster of the upper teeth, and also one of the parts upon which the appliance would have to rest. In taking the latter impression plaster was found to be of little use; an impression of this material, on account of its not pressing down the soft tissues, was misleading, and was also very difficult to remove from the mouth on account of its bulk. I afterward found that a sharp impression such as plaster gives was not at all necessary. Indeed, an impression of any kind was of but little use. The form of this part of the appliance was obtained in the first place by shaping a piece of modelling compound to roughly resemble the base of a jaw, and while still plastic, yet not soft, it was placed in the mouth, pressed into the position it was intended to occupy, and while held there molded so as to give the chin and adjacent parts a natural appearance.

This it did nicely except where the cicatrix had drawn up the face on the right side. From a cast of this mold a base or plate of Weston's metal was constructed, with the idea that the weight pressing upon the muscle would in a short time form a bed for the fixture to rest in.

Caps were now constructed, firmly united so as to give rigidity, and covering the two upper molar teeth on each side. A button was soldered on the buccal side of each of these fixtures suitable to receive the slotted end piece of a spiral spring, the lower end of which was attached to the upper surface of the base by a hinge-like joint at a point immediately under the button.

As the caps fitting the upper teeth were intended to be cemented in place, it was essential that the springs should be so attached to them that while it would be impossible for them to become accidentally detached, they could be readily removed and replaced. This was satisfactorily accomplished by the well-known mechanical device of a round hole in the end piece of the spring sufficiently large to pass over the button, from which extended toward its distal end a slot just wide enough to accommodate its stem.

FIG. 1.



This was merely a tentative device. Some trouble was experienced in keeping this fixture from sliding backward and sideways. Something more like a hinge, permitting only an up and down motion, would have been better. After a few weeks the weight of this metal plate proved a source of discomfort; it was, therefore, reproduced in black vulcanite. This was far more comfortable and retained its place much better. On the right side, where the cicatricial bands were more prominent, the pressure caused considerable ulceration, and an effort was made to relieve this and hasten the preparatory work by cutting them. This, however, was not a success; I found it better to relieve those places when the pressure was too severe by cutting from the plate. After this fixture had been worn some time the constant, yet comfortable, pressure accomplished that which the knife had failed to do, the cicatricial bands painlessly yielding.

This having now fulfilled its intended purpose, with the experience gained the construction of a permanent fixture was proceeded with.

It was decided to dispense with the springs, and in their place construct a hinge arranged on the gold caps in such a way as to permit the case to be readily removed by the patient herself.

The protruding button on each side was first filed off, as there was no further use for them, and in the double gold caps of each side was cut a very shallow groove across the masticating surface over the space between the two caps. To permit this the space had previously been filled with solder. (*a*, Fig. 2.)

At the back edge of this groove had been soldered a flat piece of platinum gold, about one-eighth inch wide and 22 gauge, so bent as to form with the groove a cylindrical opening, to receive a hook-like fixture attached to the artificial denture, curved so as to nearly touch the posterior cusp of the anterior caps, while its free end was bent slightly from the cap (*b*, Fig. 2), the elasticity of the gold permitting this hook to pass under freely when the denture was placed in position or removed, yet holding it with sufficient force to prevent its accidental displacement. As the main pressure on this hinge-like arrangement is backward, this spring is subject to little strain. The arrangement resembles somewhat the DeLong hook, with its "hump," used on ladies' dresses. The hook, permanently attached to the denture, was made of platinum-gold round wire, about No. 5 bur gauge, firmly imbedded in the vulcanite, the projecting portion bent as shown at *a*, Fig. 3, and made so as to fit and work freely in the cylindrical opening previously described.

FIG. 2.

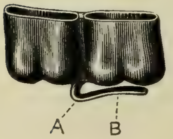
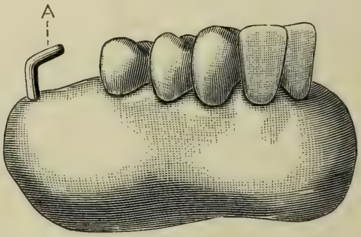


FIG. 3.



The whole formed a hinge permitting freely all desirable motions, while at the same time firmly holding the denture in the position required to restore the natural contour of the parts and performing its function in articulation. Mastication is not so perfectly performed, but the muscular tissue exerts sufficient force to render it effective upon soft food. It is, however, a great help.

The weight of the denture, while not at all excessive,—indeed but little if any more than that of an ordinary lower denture,—was found quite sufficient to cause the mouth to open when the muscles were relaxed. Very fortunately the patient retained, notwithstanding the extensive mutilation, control of the muscles to a fair degree.

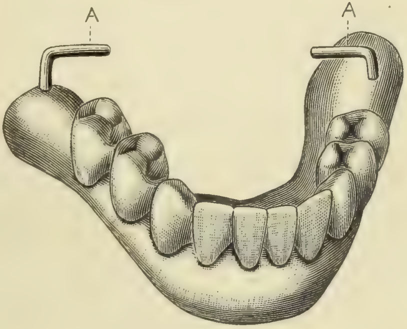
To enable the muscles to take hold of the fixture, I found it necessary to make the front of the plate project outward sharply. (Fig. 4.) After a time, when absorption had progressed, this was made more rounded, yet still quite prominent.

The bite was taken by arranging soft wax on the rubber base so as to restore the natural expression to the lips and cheeks.

The caps were removed from the natural teeth and placed on the plaster cast; this was then adjusted to the imprint on the wax bite, and was made to form part of the articulating model in the articulator.

I now proceeded to arrange the hooks to the lower denture, having found that they could be more readily adjusted on the model than in the mouth. These occupied the space usually given to the first molar teeth, leaving room for ten teeth only, which were now adjusted in the usual manner, ready for trial in the mouth. As the various parts were held in place by the hard wax cement, and therefore unable to bear without displacement any great strain, the caps were adjusted to the hooks out of the mouth and the whole carefully placed in position. When found satisfactory, it was removed and flasked.

FIG. 4.



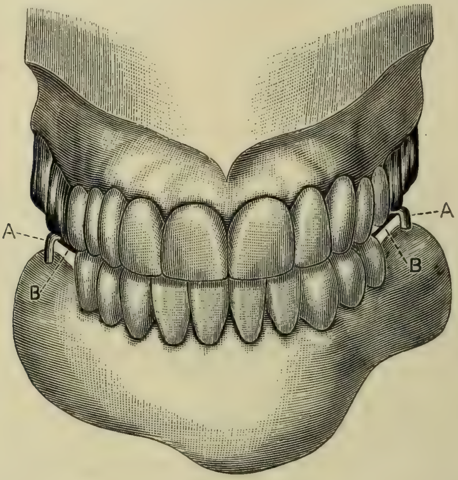
As a matter of convenience I used plain teeth, making the body of the denture of black rubber, with pink rubber to represent the gums. In order to avoid porosity I selected a grade of vulcanite containing a liberal amount of earthy matter, as I have found that while the finer grades, containing but little else than caoutchouc and sulfur, are stronger and more elastic, they are not so well adapted for dentures requiring great mass in thickness, as was the case with this one. When the denture was finished, the caps were cemented to the upper teeth of each side, the hooks slipped under the springs or catches. It required a little time for the patient to learn how to manage her artificial jaw, but the improvement in appearance and speech was immediate and very satisfactory.

After a few months the absorption of tissue was so great that comfort and appearance required additions at various points. Indeed, about six times during the year and a half it had been worn these additions have been required, until it is now probably four times as large as when first inserted. (Fig. 5.)

In order to avoid repeated vulcanizing I made the additions several times by adding shellac, which I found readily adhered to the vulcanite, and which lasted quite a long time, on one occasion as long as four months. When the mass of shellac became extensive it was replaced in vulcanite.

When the absorption under the plate became somewhat extensive the patient complained of discomfort, giving her the impression of a vacancy underneath the appliance. This she herself corrected several times by placing under it at the front part a small rubber ball about an inch in diameter. This at first was useful, but I soon found it necessary to discourage the expedient, as I was impressed that unless well guarded it was likely to cause mischief from a too extensive absorption.

Fig. 5.



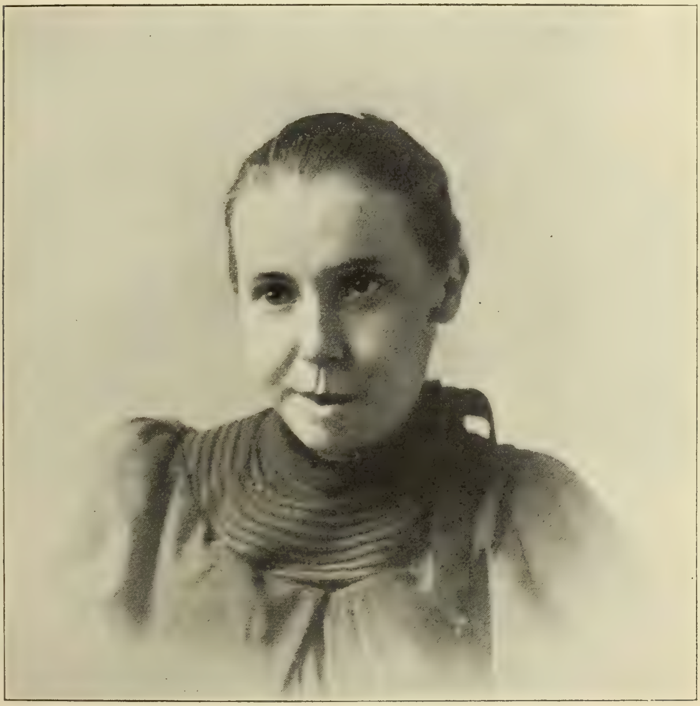
No attempt was made to run the denture as far back as the ramus of the jaw, as is usually done, on account of the extensive contraction of the muscular tissue at that point. Had it been so done, such was the condition of the parts, there would have been danger of puncturing the cheek. In this case no possible advantage would have resulted from a further backward extension.

At this time I think the limit has been reached. In making further additions there would be practically no limit as to what could be added, as all kinds of tissue will give under the pressure exerted. For a long time no change has been made on it; the restoration of features and the restored function of the maxilla remain entirely satisfactory. (See Fig. 6.) This artificial maxilla differs from most, if not all, on record on account of its simplicity.

I am impressed that much of the extra labor in this case could have been avoided, and perhaps a more satisfactory arrangement could have been made, had the prosthetic replacement of the extirpated jaw been considered when the operation was performed. Of late vulcanite and tin forms have been suggested to be put in place immediately after the surgical operation.

I think the greatest difficulties in this case would have been obviated if the bone had been removed through the mouth, by dividing the diseased jaw with a band saw and removing it in sections, and so avoiding the extensive cicatricial bands which proved so troublesome.

FIG. 6.



Papers on the general subject will be found in journal literature as follows:

London Review, vol. v, page 279.

American Journal Dental Science, 1857, vol. vii, page 199.

Dental Record, 1890, vol. x, page 198.

An account of immediate insertion. Operation proposed December 14, 1878; *L'Odontologie,* November, 1888.

American Journal Dental Science, third series, vol. xxii, page 558, April, 1889.

THE EXTRACTION OF THE FIRST PERMANENT MOLARS.—A BENEFICENT CONSERVATIVE OPERATION.

BY W. MITCHELL, D.D.S., LONDON, ENG.

(Read before the American Dental Society of Europe, August 3, 1898.)

MR. PRESIDENT and gentlemen, much has been written upon, and much discussion has been evoked in connection with, these more or less troublesome and often unsatisfactory organs of mastication. That they are probably the source of more trouble to the patient and more solicitude to the dentist than any of the other teeth I think we are all agreed, and not infrequently after we have done our best by the different modes of treatment and the use of tried and newly-acquired agents, both medicinal and reparative, have we been compelled to acknowledge defeat in our object,—viz, the comfortable, useful, and unprejudicial retention of these teeth.

It is not the province of this short paper to go into the physiology and histology of the first permanent molar, which differs in a general way but little from that of the other teeth, neither shall I go into the pathology of dental caries, both of these subjects having their own worthy exponents, who, at different times, have treated these subjects in masterly fashion according to their individual knowledge and capacity.

The points I wish to bring forward for your consideration are: Why and when shall this operation, *i.e.*, the extraction of the first permanent molars, be performed?

I propose by my deductions, based upon experience, to convince those who have heretofore been opposed to the extraction of these teeth that we have a practical and legitimate means of preventing, to a great extent, the ravages of dental caries, especially that form produced by lateral pressure, and securing a more comfortable and serviceable dental armament by more perfectly safeguarding the interproximal space than is possible by flat and imperfectly contoured fillings; and later by affording patients a more perfect masticating surface; and last, but not by any means least, the satisfaction of securing to patients in the most practical way probable immunity from constant and prolonged dental operations during the greater part of their lives.

Briefly stated, my proposition is this: Where the first permanent molars are in a condition of decay or retrogression, from whatever cause, that suggests the probability of their being a source of continued trouble to the patient, I would strongly urge their removal, provided the operation be performed at the right time. In order to secure the desired results, it is absolutely necessary that the child be constantly under the supervision of its dental attendant, with whom then rests, to a very great extent, the condition of the mouth and the subsequent condition of the teeth.

Nearly twenty years ago I first gave this subject my attention; and while I had but little opportunity at that time of putting my ideas into practice, I have, as time has gone on, been fully convinced by results that the operation is a good one, conferring as it does a lasting benefit to my patients and a great amount of satisfaction to myself.

The age at which this operation should be performed must be determined by the dentist, according to the requirements of each individual case. My experience is that the age and development of the patient varies somewhat, my cases varying from ten and one-half years to twelve years and possibly a few months, depending usually upon the accelerated or retarded general development of the child. You, gentlemen, as well as I, have seen cases of dental precocity that was difficult to account for, which accentuates what I have previously said as to the necessity of deciding each case upon its individual merits.

I would strongly urge that this operation be performed from four to six months prior to the eruption of the second permanent molar. The time can be determined by the eminence and rounding of the superimposed tissue over this tooth; an idea can also be formed as to the near or remote approach of the second permanent molar by puncturing the gum with a fine, sharp-pointed exploring instrument after cocain has been applied. This means of diagnosis is rarely required, as the objective symptoms incidental to the eruption of a molar tooth are usually a sufficient guide when to operate.

After deciding upon this operation, it is imperative that *all four* of the first permanent molars be extracted, even though one or two be quite sound. By this means alone can the best general results be attained. By operating at the time suggested, the second permanent molar will travel forward during the process of eruption, and its antagonizing tooth will do likewise, and the result will be the securing of a more perfect articulation than where no regard as to time or completeness is paid in connection with this operation. Some criticism will undoubtedly be advanced as to the possible modification of the antagonism of the teeth, contraction of the dental arch, shortening of the bite, etc. I can only say that the cases I have operated upon—a few of the models of which I will pass round for your inspection—speak more eloquently than I can as to these points.

In no case have I noticed any change in the features or contour of the face (this is undoubtedly what would occur were the dental arch contracted by the extraction of these teeth), but this is prevented, as shown by the models, by the second permanent molars rapidly assuming the position of the extracted teeth.

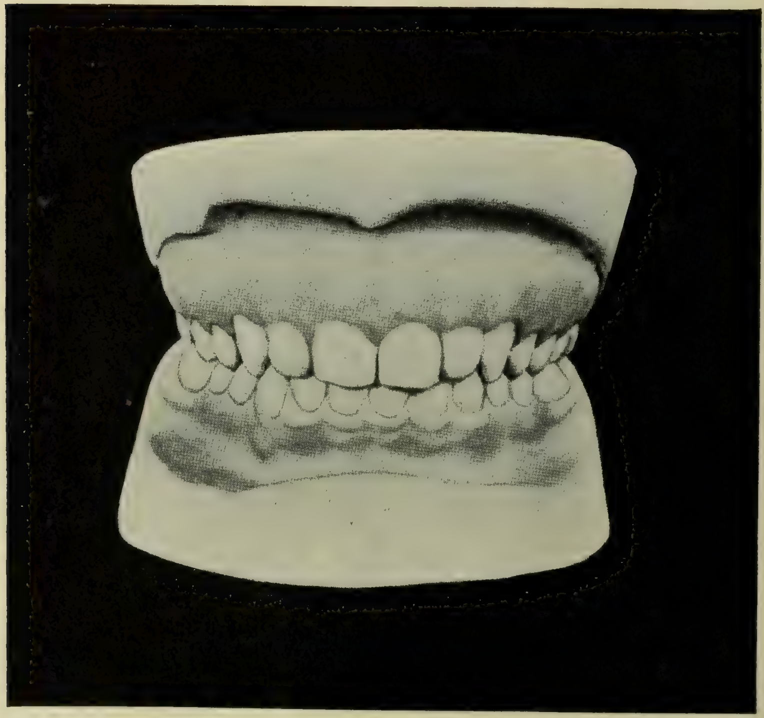
As to any material change taking place in the occlusion of the second and third molars, thereby decreasing their efficiency, I have not yet discovered.

We all know that an ideal articulation is practically one of the creations of our own imaginations. What may be an ideal to one person would not be to another, and ideals change with time and circumstances. What might be considered an ideal dentition at twelve years of age might be an incongruity at forty, hence time, circumstances, and surroundings must be considered in connection with our ideal dental armament. Therefore I contend that the nearest approach to an ideal condition of the mouth at any age is where its dentition is in the best condition to resist decay, to be in the most effective condition for mastication, and at the same time to be the least possible trouble to both patient and dentist. If my contention is correct, then the operation I advocate answers these requirements better than any other method of procedure with which I am acquainted.

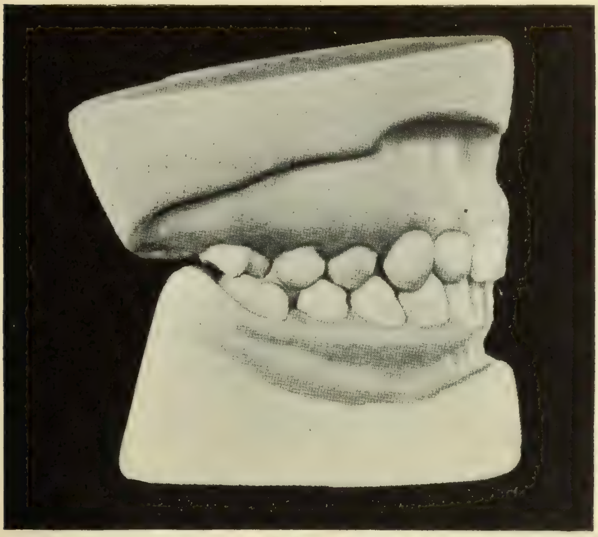
I will present a few cases which, with the exception of Case 1, are illustrated by the models.

Case 1.—Mr. A, aged eleven years at time of operation. First lower molars imperfectly developed, large anterior approximal cavities, grinding-surfaces honeycombed by decay, first upper permanent molars imperfectly developed but not decayed. Child fairly well nourished, growing rapidly. Family history, from a dental standpoint, bad,—father averaging more than one filling per tooth, has several artificial crowns and several extractions: mother wearing full upper and lower artificial dentures; elder brother had two or three fillings in all teeth except two, which were crowned; elder sister practically a replica of the foregoing. After considerable argument I prevailed upon the father to allow the extraction of the four molars; he demurred very much at the extraction of the two upper ones, but I said I would extract all or none. I extracted the teeth. Eight years after I put a small gold filling in a fissure in the second left upper molar, and three years later I put a similar filling in the opposite tooth. I found the articulation practically perfect. These were the only dental

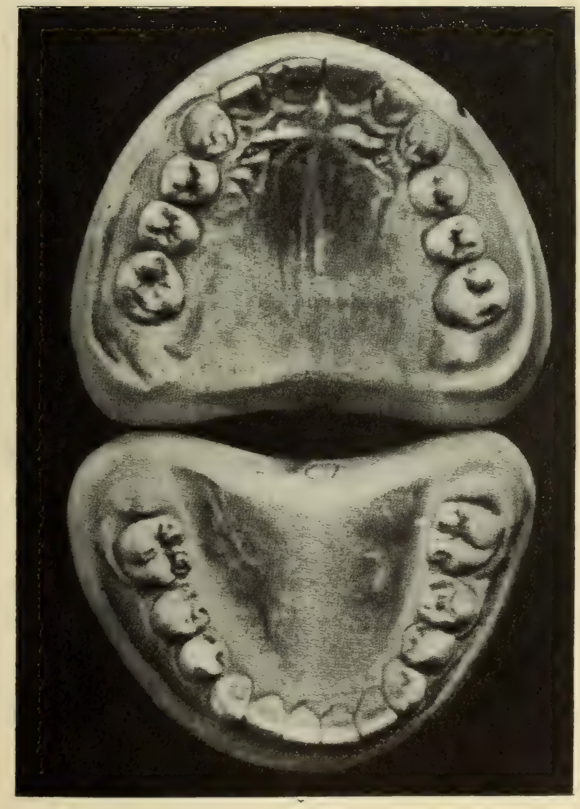
CASE 2—FIG. 1.



Case 2—Fig. 2.



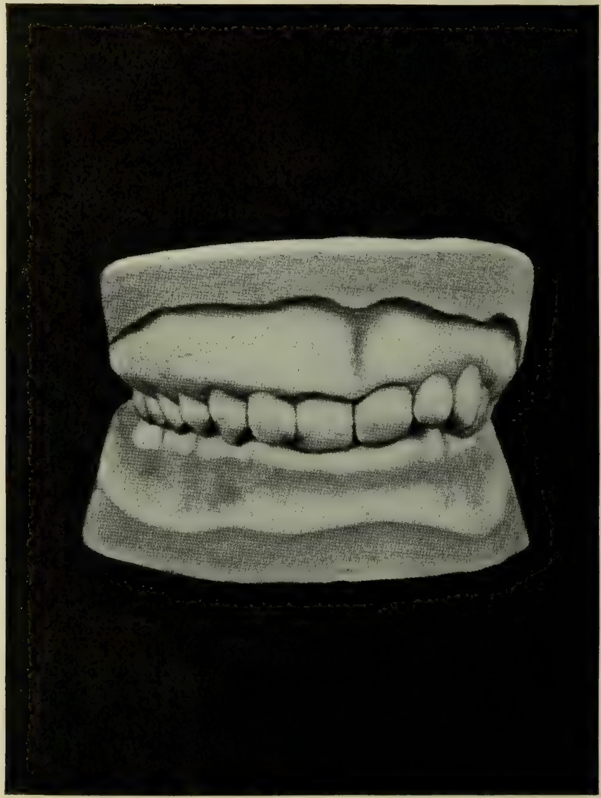
Case 2—Fig. 3.



operations required in eleven years, and to-day he is the only member of his family who has good teeth and a really comfortable dentition, although apparently of the same type as his father.

Case 2.—Miss B., aged eleven and a half years at time of operation, child well nourished, growing rapidly. Condition of teeth: ten fillings in various stages of efficiency in the four first permanent molars, with cavities in the approximal surfaces of the second left lower bicuspid and distal approximal surface of first left lower bicuspid. Family history, from a dental standpoint, not good on maternal side; do not know condition of father's teeth. Mother's teeth required much filling; brother, about two years her junior, has required twenty fillings in his teeth during the past seven years.

CASE 3—FIG. I.

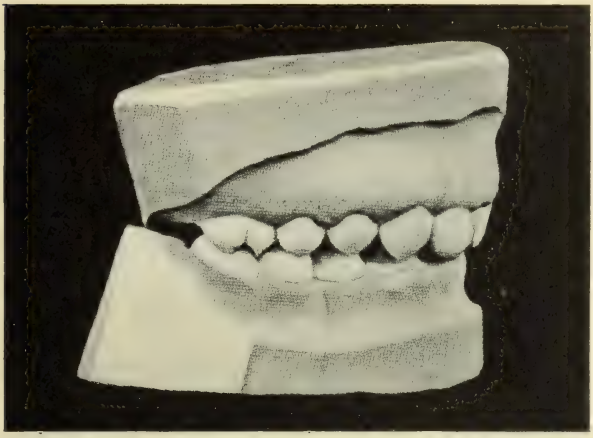


This patient, I may say, was not under my care when I could have extracted his first permanent molars to advantage. A brother, about three or three and a half years her junior, required five fillings in his first permanent molars in five years, and four fillings in other teeth. A still younger brother, for whom I extracted the first permanent molars, has required six fillings in the other teeth in five years, while Miss B. has only required five fillings, all told, since the extractions. I would say, in respect to these children, they are all well nourished, lived in the country, are well developed, and all well above the average height, and their teeth are apparently of the same type and quality.

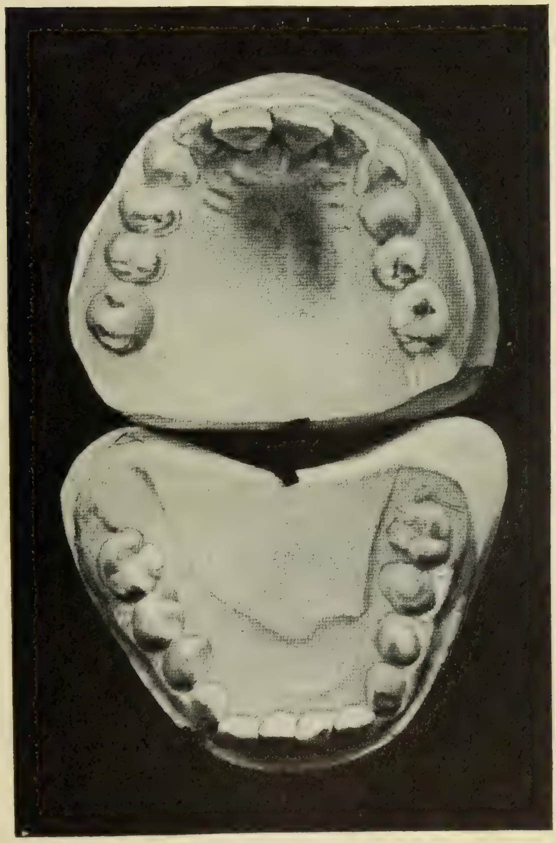
Models show the case three years after extraction; present condition of mouth good.

Case 3.—Master C., aged eleven and a half years at time of operation.

CASE 3—FIG. 2.

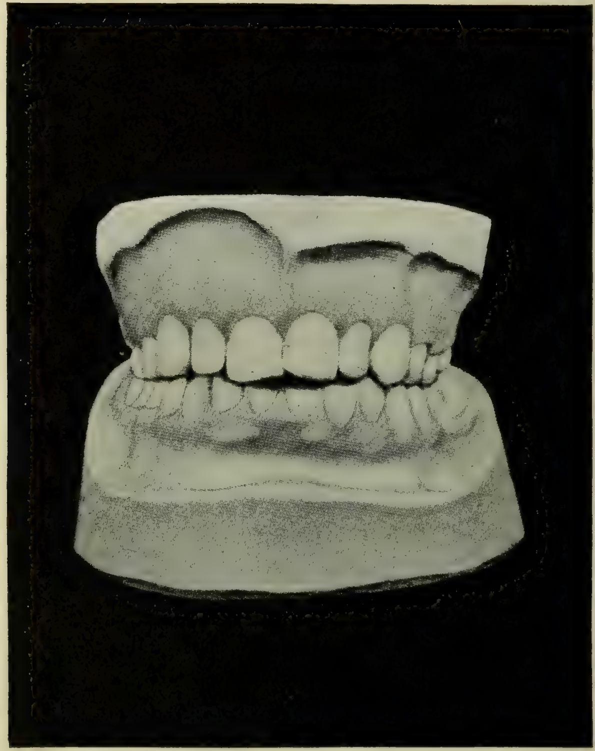


CASE 3—FIG. 3.



Family dental antecedents not good; father, mother, and elder brother had much trouble with their teeth. Father and mother both wearing partial artificial dentures. Patient required ten fillings in the four first permanent molars inside of three years; twelve fillings in the remaining teeth have been required during the past four years. The close bite, as illustrated by the models, is hereditary, being identical with that of the mother's. There was no attempt made to correct the irregularities or malocclusion of the bicuspids. The parents thought, the child being comfortable, they would not resort to regulating. The quality of these teeth is below the average; present condition of the mouth fair, but better than it was at the time of extractions. Models show the case three years after extraction.

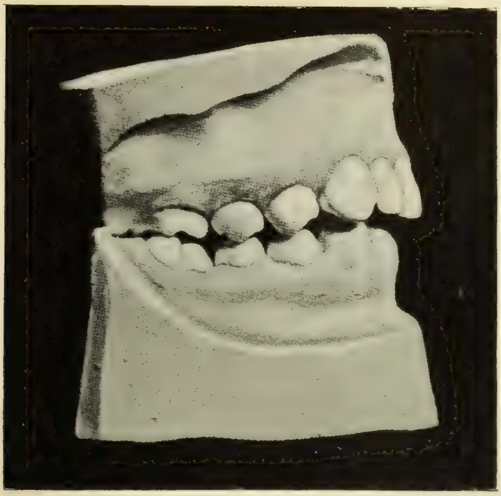
CASE 4—FIG. 1.



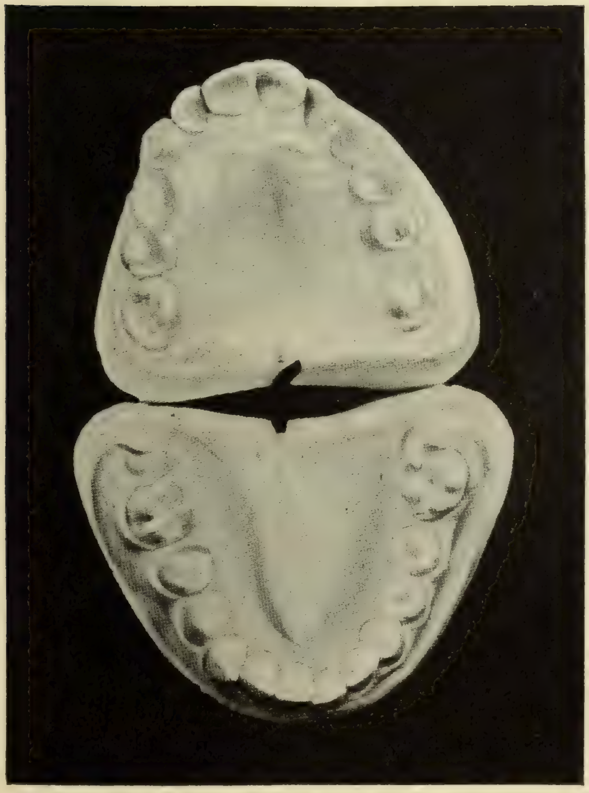
Case 4.—Miss D., aged about ten and a half years. When upper molars were extracted patient went away to school, and while there had operation completed, but only after allowing some months to elapse. Family dental history bad on paternal side, father wearing full upper and partial lower dentures. Condition of teeth prior to operation imperfectly developed and rapidly breaking down. Models show case five and a half years after extraction of upper molars, during which time but two small fillings have been required on palatal surface of upper lateral incisors. It will be noticed how the delay in extracting the lower teeth has modified the occlusion as compared with the other models, leaving a large undesirable interproximal space. Present condition of the mouth very good.

Case 5.—Miss E., aged about eleven years at time of operation, which required ether, as the teeth were so badly broken down. Family history, from a dental standpoint, bad, father and mother having worn partial artificial

Case 4—Fig. 2.

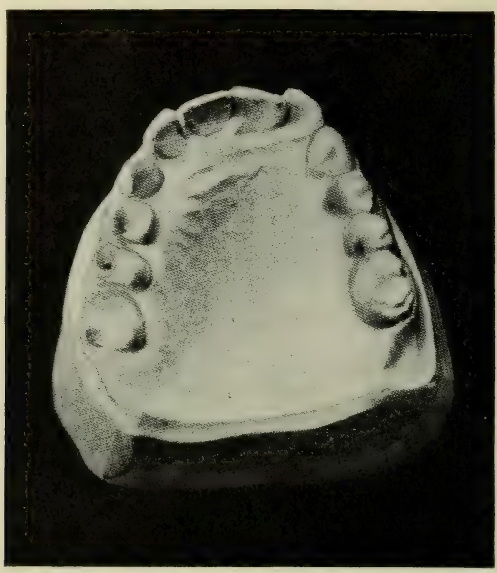


Case 4—Fig. 3.



dentures for the past fifteen years, elder brothers and sisters especially requiring continuous dental attendance. Patient of highly nervous temperament and advanced mental development for her years, rendering the preparation of cavities for filling properly practically an impossibility. The first permanent molars I had filled many times with cement and gutta-percha, also with copper amalgam, only to see them break down again about the fillings, and at other points. The remaining teeth are of a frail, delicate nature, and owing to the natural arrangement of the upper ones cavities which are a replica of the father's have formed on the approximal surfaces of the incisors which I have filled. The record of the case shows that in about four years thirteen fillings were required in the four first permanent molars owing to the causes already mentioned, as well as nine fillings in the other teeth. The model of the upper jaw—I am unable to find the model of lower jaw, which has inadvertently been thrown away—shows the case eighteen months after the operation. The present condition of the mouth is better than it has ever been, but not quite satisfactory owing to the great tendency of the teeth to disintegrate, occasioned by their frail development.

Case 5—Fig. 1.



To summarize in regard to this operation, I would say it has proved a good one in my hands, looked at from any standpoint, as I feel that our first duty to our patients is to put their mouths in the best and most lasting comfortable condition possible, securing to them at the same time the most serviceable and effective masticating surfaces, in conjunction with an immunity from the requirements of constant subsequent dental operations. These are *not* specially selected cases, but models were made from impressions taken as opportunity offered, and have, I hope, demonstrated the possibilities of this operation, *when performed at the right time*, to be as claimed for it in the title of this paper. This operation is *not* of universal application, but is one that, in careful hands and under proper conditions, will benefit the patient more, and probably reflect as much credit upon the operator as any with which I am acquainted.

At the risk of repetition I will finally urge *the necessity of making the operation complete at the right time.*

A FEW CONSIDERATIONS IN FILLING TEETH.

BY C. N. JOHNSON, L.D.S., D.D.S., CHICAGO, ILL.

(Continued from page 458.)

THE INTRODUCTION, CONDENSATION, AND FINISHING OF GOLD FILLINGS IN APPROXIMAL-OCCLUSAL CAVITIES IN BICUSPIDS AND MOLARS.

THE MATRIX.

A NECESSARY concomitant to the proper consideration of the insertion of contour fillings in bicuspids and molars relates to the question of the matrix. A perfect understanding of its advantages and limitations should be acquired by every operator, in view of the fact that if properly employed under suitable conditions it is capable of materially lessening the fatigue and difficulty of these operations, while if used ill-advisedly or unskillfully it leads to the gravest defects in the work and proves simply a delusion and a snare.

The chief office of the matrix is to supply the missing wall of a cavity, thus converting an approximal cavity of three walls into one of surrounding walls. This becomes a matter of very great importance in distal cavities far back in the mouth, on account of the angle at which a plugger must approach such cavities. Unless there is a supporting matrix-wall against which to build the gold, the filling must either be made unnecessarily full while it is being built or else it must fail of adequate density on the approximal surface. With a matrix properly adjusted, the correct contour can readily be given the filling while the gold is being condensed, so that little trimming is necessary in finishing, and the surface may be made as hard as desired. It will very materially lessen the labor and nervous strain of an operation, and will therefore well repay the study necessary for its successful use.

The main objections urged against the matrix may be summarized as follows: The difficulty of obtaining adaptation of the gold into the angle formed by the junction of the matrix with the margin of the cavity thus resulting in imperfect margins to the filling, and the obstruction which the matrix is supposed to form to a good view of the cavity. Each of these objections is well founded under certain conditions, and each is equally inoperative under certain other conditions. If a thick, stiff matrix is used and tightly wedged against the cavity outline, it will be found difficult to properly carry the gold over the enamel-margin and secure a perfect sealing of the cavity, but if a matrix is made of a thin, springy material, capable of being forced away from the cavity-margin at will, so that the gold may be carried between the matrix and the margin, there is really no obstacle in the way of doing perfect work. In fact, the proper use of the matrix will facilitate the making of good, dense margins to our fillings with less difficulty in these distal cavities than where the attempt is made to build the filling in an open cavity. The matrix is a support to the gold during condensation, and it has a sustaining influence to hold the filling to form under the impact of the plugger. If a mallet blow is used on the gold in the direction in which it is often necessary in these cavities far back in the mouth, the tendency is to force the gold away from the cavity-margins, unless there is some sustaining wall against which to build. This matrix-wall keeps the gold up to its place and gives the opportunity for free malleting without rolling the gold away from the axial wall and margins.

This does not imply that the greatest care is not always necessary in the use of the matrix. As has been intimated, no matrix should be used which is not capable of being forced by the plugger sufficiently away from the cavity to admit a mat of gold between it and the margin. Given a matrix which on adjustment fits approximately to the margins of the cavity, the aim should be, in placing the first pieces of gold over the cervical wall, to so force back the matrix with the plugger that it will stand away from the buccal and lingual margins at least half a millimeter, and this space should be maintained throughout the building of the filling. If this is done the margins may be readily covered and the gold made dense and perfectly adapted.

The objection as to the obstruction of light and vision from the cavity holds good if a broad matrix be used on a mesial cavity, but there is no obstruction whatever on a distal cavity. In view of the fact that there is seldom any necessity for a broad matrix on a mesial cavity, the question becomes one of judgment in the selection of suitable cases for the matrix rather than one bearing on a fundamental objection to the appliance itself. The most that is ever required in the way of a matrix on a mesial cavity is a narrow strip of metal placed across the cervical third of the cavity to give form to the filling in the interproximal space and provide a guiding wall against which the filling may be so built that it will require very little subsequent trimming in finishing it. This form of matrix does not materially obstruct the view of the cavity, and it furnishes all that is necessary in the way of a matrix for these cavities.

Another objection which is sometimes urged against the matrix may be mentioned merely to controvert it,—viz, the difficulty of securing adaptation of gold to the surface of the matrix. The claim is made that in building gold against a matrix it is seldom that a filling is perfect on the approximal surface owing to spaces being left here and there as the gold is laid against the matrix. If this be true, it is due to either one of two things,—an oversight on the part of the operator or improperly formed pluggers. That gold can be perfectly adapted to a surface like the matrix has been too often demonstrated to require further emphasis. It is surely as easy to adapt gold to a matrix as to the wall of a cavity, and it is safe to conclude that in many of the cases where the surface of the filling next to the matrix has been found defective the surfaces next to the walls of the cavity would present similar imperfections, if the same facilities for examination were available. The chief distinction between building gold against the flat surface of a matrix and the flat surface of a cavity is that the former is somewhat more disastrous to plugger points than the latter, the serrations being more rapidly battered down when coming in contact with steel than with dentin or enamel.

The Kind of Matrix.—No one form of matrix may be deemed available for all cases, and in some instances it will be found desirable to improvise a matrix specially for the case in hand. The band matrices made of thin steel, such as the Brophy matrix, serve an excellent purpose for ordinary work, though they are not universally applicable. The material of which these matrices are made is almost ideal for the purpose. The steel is sufficiently rigid to sustain the gold against thorough malleting, and yet its springy nature admits of it being forced away from the cavity-margins by pressure of the plugger. There are some objections to these matrices which occasionally assert themselves, chief of which may be mentioned the fact that in bell-crowned teeth the matrix embraces the tooth tightly near the occlusal surface and stands some distance away from the neck along the cervical half of the cavity. This objection may readily be overcome by packing some gutta-percha into the interproximal space between the matrix and the approximating tooth, so as to force the matrix up to the cervical margin of the cavity. Wooden wedges have sometimes been advocated for this purpose, but the danger with these is that the wedge is likely to force the matrix too close to the margin, and the wood is so unyielding that the plugger cannot press the matrix back to allow the gold between it and the margin. With gutta-percha the matrix may be carried as close to the cavity as desired, and the material will be found sufficiently yielding to admit of manipulation by the plugger so as to secure perfect protection to the cavity-margins.

Another difficulty sometimes encountered with the band matrix is the problem of maintaining it in position on teeth that are more cone-shaped than bell-crowned,—where the axial surfaces slope from the gingival line to the occlusal surface in such a way as to present an inclined plane along which the matrix slides to its displacement. Occasionally this may be prevented by packing hot gutta-percha between the matrix and the buccal and lingual surfaces of the teeth and letting it cool before there is any manipulation of the matrix. If the gutta-percha is quite hot, it will be more or less adhesive both to the matrix and the enamel, and it will often prove effective. In cases where this will not answer cement may be substituted, though this requires so much time for its application and crystallization that it is indicated only in those cases where nothing else will suffice and where such a matrix seems to be especially demanded.

Another feature of the band matrix calls for attention so far as the comfort of the patient is concerned. In very many of the cases where a matrix is indicated it will be found that the decay has extended so far rootwise that the cervical margin of the cavity is some distance beyond the original free margin of the gum. This tissue has consequently either receded or been forced out of the way with gutta-percha in the manner already described in the consideration of cavity preparation. Under these conditions the gum in the adjoining interproximal spaces extends much farther crownwise than that in the affected space, and if the matrix is carried sufficiently rootwise to cover the cervical margin of the cavity,—which it must be in order to prove effective,—that portion of the band in the adjoining interproximal space impinges forcibly on the gum tissue, to the serious discomfort of the patient. The only remedy for this is to cut away the edge of the band which passes into the adjoining space in such a manner that a considerable concavity is presented to the gum instead of a convexity, and this should be done with all band matrices, even though it involves the necessity of having a separate set for each side of the mouth.

When it becomes desirable to make a matrix for the special case in hand, a suitable material for the purpose is found in copper or German silver rolled thin. This may be wrapped around the tooth and fashioned with a burnisher to any desired form, and the two ends tacked together with solder.

The narrow matrix for the interproximal space in the management of mesial cavities may be conveniently made from an old watch-spring. This should be broken into lengths varying from a third to half an inch for the different sized teeth, and then ground convex on one edge so as to dip down into the space with the convexity looking rootwise. The varying degrees of curve to the spring may be utilized in the selection of suitable forms for the different teeth. For instance, a lower second bicuspid which is nearly round at the neck would call for a matrix made from near the center of the spring, where the curvature is greatest, while for a molar with a broad approximal surface the matrix should be made from the periphery of the spring, where there is little curve. These matrices may be slipped between the teeth and held in place ordinarily by their own form, the convexity of the curve resting against the approximating tooth just rootwise of the contact point. If the space between the teeth is so great that they will not remain of their own accord, they may be fastened with gutta-percha, as already described. When the filling is completed, this form of matrix should be removed by forcing it either buccally or lingually, it being ordinarily impossible to remove it occlusally.

Manner of Using a Matrix.—The greatest care should be exercised in securing a proper adjustment of the matrix to the end that it shall be maintained in position during the condensation of the gold, and that it shall have such a form that when the filling is built against it the approximal surface of the filling will present a contour that requires little trimming. The matrix should dip in close to the tooth at the cervical region of the cavity, and stand out tight against the contact point of the approximating tooth near the occlusal surface. If it does not take this position when applied to the tooth, it should be forced to take it by packing gutta-percha in the interproximal space, as previously suggested, and by burnishing the free end of the matrix against the approximating tooth. One of the prime advantages of the matrix is that by its use a filling may be so malleted as it approaches the contact point of the approximating tooth that the contact point on the filling is given the greatest possible density without building any excess of material. The matrix should be so thin that when the filling is condensed and the matrix removed there is practically no space left and the gold falls against the approximating tooth. By the use of the matrix a tooth may be filled and the proper contour maintained with less separating than where no matrix is used.

Before placing any gold in the cavity it is well to go along the matrix-wall with a plugger and test it, to see if it may be pressed away from the cavity-margins at will. If there is any point where it seems too rigid, so that there is likelihood of an oversight in adapting the gold, this portion of the matrix should be forced away from the margin in advance of the operation, to make certain of a ready overlapping of the gold.

When the matrix is satisfactorily adjusted, the filling may be started by introducing a rope of non-cohesive gold along the cervical wall and wedging it into the angle between the cervical and axial walls, and also locking it into the cervico-buccal and cervico-lingual angles. When the first part of the filling is thus securely fastened in position, the gold should be carefully condensed over the cervical border of the cavity by forcing the matrix slightly away from the margin with the plugger and slipping the gold in between the margin and the matrix. This may readily be done with a plugger formed like that in Fig. 50, placing the serrated end on the gold and tipping the shank against the matrix to force it back. When this is successfully accomplished along the entire cervical margin, and the non-cohesive gold is covered by a layer of cohesive pellets, the mallet may be used to secure thorough condensation over the whole area of gold, and especially at the junction of the gold with the matrix. The plugger should be carried step by step along the matrix-wall until the filling is hard and dense. If this precaution is taken throughout the operation, and if the gold is not laid on in too large masses, there will be no doubt about the uniformity of density on the approximal surface of the filling.

To secure the best results in building against a matrix, the pellets should be laid with their sides to the matrix and their ends looking buccally and lingually, while the filling should be kept nearly horizontal.

As has already been intimated, from the time the first pieces of gold have been forced between the matrix and enamel the appliance should be kept sufficiently away from the cavity during the operation to admit of carrying the gold well over the peripheral enamel-margin. With these precautions there is no need for poor work with the matrix, but unless an operator is prepared to give close attention to the points indicated he would better dispense with the appliance altogether. It is an appliance which if abused or misunderstood is exceedingly treacherous, and will result in very faulty work, but if used with judgment and care it is capable of materially lessening the strain of these complicated operations, and will prove a source of great satisfaction to the operator.

The plan of building these occluso-approximal fillings will be considered in greater detail under the heads of the different cavities.

(To be continued.)

OPEN MAXILLARY SINUS WITH CONCOMITANT MAXILLARY SINUSITIS.

BY FANEUIL D. WEISSE, M.D.,

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(Read before the First District Dental Society of the State of New York, December 13, 1898.)

In order to have a proper conception of this condition I propose to preface the direct consideration of the subject with some brief practical remarks on the anatomy and physiology of the maxillary sinus, together with a review of the causes which lead to the development and perpetuation of open maxillary sinus with concomitant maxillary sinusitis. I trust that I may not be regarded as too iconoclastic or revolutionary in my views, and that they may commend themselves as founded on anatomical, physiological, and pathological conditions; the therapeutical indications to be fulfilled and the means employed in carrying out the same have been proven by repeated experience in practice.

Anatomy.—The sinus maxillaris, maxillary sinus, antrum, and antrum of Highmore are the several names given to the cavity in the body of the superior maxillary bone. (Nathaniel Highmore, an English physician, born 1613, died 1684, is usually thought to have been the first who described this cavity. This is an error, as it had been described by earlier anatomists. Galen described it under the name of "sinus maxillare." All English writers since Highmore have designated it as the "antrum of Highmore.") The proper anatomical name for this cavity is *sinus maxillaris,* or maxillary sinus, thus associating it, as it should be, with the other diverticula from the nasal cavity. The names "antrum" and "antrum of Highmore" should be discarded. These sinuses, like those in the body of the sphenoid and the frontal bones and the cells of the lateral masses of the ethmoid bone, are cavities hollowed out of the bone structure and lined by periosteum and mucous membrane continued into them from the nasal cavities.

The walls of a maxillary sinus form the body of a superior maxillary bone, which has the shape of a vertical wedge; the apex of the wedge is at the malar articulation of the bone; the base forms the outer wall of the nose cavity; the superior face forms the floor of the orbit; the exterior face forms the internal wall of the zygomatic fossa; the anterior face forms the facial surface; the inferior face—forming the floor of the sinus—has developed upon it the alveolar process of the bone. It is to be noted here that the sinus has its floor structure proper before the development of the scaffolding structure of the alveolar process for the lodgment of the roots of the teeth, and after the absorption of the alveolar process consecutive to the loss of the teeth. In illustration of this I show you these two skulls; one of about the period of birth, and the other at the period of old age, after the teeth have been shed; in both specimens a perfect floor or inferior wall of the maxillary sinus presents.

The roots of the teeth of the upper arch are seemingly projected as if to perforate the floor of the sinus, but in reality the alveolar process develops so as to socket the entire roots of the teeth exteriorly to the proper osseous floor of the sinus. At times the encroachment of certain teeth, usually the second and first permanent molars, is such as to raise the floor of the sinus into elevations. In these cases, always, the alveoli are lined by the tissues at the apical spaces at the roots of the teeth, while the sinus, opposite to the alveolus, is lined by a portion of the periosteum and mucous membrane common to the entire sinus cavity. It is stated by some authorities that the floor of the sinus is at times perforated by the roots of the second or first molar teeth, but these instances are probably from post-mortem specimens or after pathological conditions had existed in the alveolus of the root involved. In post-mortem specimens presenting perforation, the perforations are due to the handling in the cleaning and the process of maceration of the bone; while in pathological specimens perforations are due to destruction by necrosis of the osseous floor of the sinus. In this skull you will see an illustration of the usual perforation,—a round hole found in the inferior wall of the maxillary sinus, caused in all probability by the process of maceration of the skull.

The roots of the teeth—cuspids, bicuspids, and molars—as socketed in the alveolar process, the osseous scaffolding developed for their lodgment inferiorly to the special osseous flooring of the sinus, have varying relations to the cavity of the sinus; that is, their roots vary in the nearness of their approach to the cavity of the sinus. In this specimen the upper cuspid, bicuspids, and molars of a side have been extracted; the labial walls of the alveoli have been broken away, and the anterior wall of the sinus has been broken away, so as to expose the interior of the floor of the cavity of the sinus. This preparation thus enables us to appreciate the nearness of approach of the roots of these teeth to the cavity of the sinus. The cuspid alveolus runs up into the root of the nasal process of the superior maxillary bone, entirely internal to the cavity of the sinus and separated by osseous tissue from it. The first and second bicuspid alveoli, less deep, and lodged entirely in alveolar process, are well separated by osseous tissue from the sinus cavity. The first molar alveolus, bedded in alveolar process, approaches closer to the sinus cavity, but it is separated from it by a well-defined thickness of osseous tissue. The second molar alveolus, lodged in alveolar process, approaches much closer than any of the others to the sinus cavity, being separated from it by only a thin layer of osseous tissue. The third molar alveolus, lodged in alveolar process posteriorly to the sinus cavity, is well separated by osseous tissue from the cavity of the sinus. From the specimen, the order of the nearness of approach of the roots of these teeth, as lodged in the alveolar process, to the cavity of the maxillary sinus is as follows: Second molar, first molar, second bicuspid, third molar, first bicuspid, and cuspid.

It is stated by embryologists that the maxillary sinus is present as early as the sixth week of fetal life; thereafter it increases in size with the development of the bone. In adults it is larger in males than in females, but it is subject to many variations in size, even in the same subject on the two sides. The base wall of the body of the bone, which is also the base of the sinus cavity, forming the outer wall of the nose cavity, presents a large deficiency, which is greatly diminished by the application to the internal face of the body of the bone of portions of the palate, ethmoid, and turbinate bones. The comparatively small aperture remaining, located in the middle meatus area of the nose cavity, is the point of communication of the sinus with the nose cavity. The posterior, external, superior, and anterior walls of the sinus are tunneled by canals for the transit of vessels and nerves to and vessels from the teeth, the mucous membrane of the maxillary sinus, and the gums. The exterior of the body of the bone is covered by periosteum and the superimposed parts. The interior of the maxillary sinus is lined by a delicate and peculiarly structured periosteum, which in turn is lined by a closely adherent mucous membrane; the latter is rich in blood-vessels, lymphatic vessels, and nerves, and particularly rich in mucous glands of large size and varying shapes. With some modification, the periosteum and the mucous membrane of the maxillary sinus are identical with those of the nasal cavity and its other diverticula. The osseous borders of the aperture of communication between the maxillary sinus and the nose cavity are covered by periosteum and mucous membrane in transit from the nose cavity into the sinus, and their presence narrows the opening to the size of admitting a probe, a quill, or even a larger body. The circumferential mucous membrane at this opening is to be remembered, as in some cases of maxillary sinusitis its swelling may obstruct the flow of pus from the sinus into the nasal cavity.

Physiology.—The functions of the maxillary sinus are:

1. Respiratory, in common with the other diverticula of the nose cavity, in that they are chambers for the warming of the air. Air, always being present in them, is warmed by contact with their interior mucous membrane, which contains capillaries filled with blood at 98½° F., which warmed air is drawn down by inspiration into the larynx, trachea, etc.

2. Vocal, as reverberating cavities for the modulation of the voice sounds.

Pathology.—Diseases of the maxillary sinus may be divided into:

1. Primary or initial (not under consideration in this article), due to pathological changes of the linings or walls of the sinus.

2. Secondary or sequential, due to causes exterior to the sinus.

The secondary or sequential diseases of the maxillary are:

1. Empyema.
2. Maxillary sinusitis.

1. *Empyema of the maxillary sinus* is the correct pathological name to apply to the presence of pus in this cavity. (I have always maintained that the term "abscess" as applied to the maxillary sinus is a pathological misnomer. The pus of an abscess, resulting as it does from inflammation of the central tissue of a part, is lodged within tissue, while in the case of pus in the maxillary sinus the pus is in an actual cavity. I was much pleased in reading the following in Mr. Salter's article in Holmes's "System of Surgery": "The term 'abscess of the antrum' conveys a wrong impression of the real nature of this disease; it is not the suppuration of inflamed parenchyma, but the occlusion in a cavity of the purulent secretion from the surface of a mucous membrane which lines that cavity.") This condition may be due to the following causes:

a. The entrance into the sinus of pus from an abscess of a contiguous alveolus or from a contiguous sinus, or from the nose cavity.

b. The presence of pus in the sinus from maxillary sinusitis.

2. *Maxillary sinusitis* is a name which I would give to exudative inflammation of the mucous membrane lining the sinus. The causes of maxillary sinusitis are:

a. Acute and chronic rhinitis.
b. Foreign bodies in the sinus.
c. Traumatism.
d. Inflammation or abscess in contiguous alveolar cavities, with consecutive abnormal opening into the sinus.

a. Acute and chronic rhinitis are, because of the continuity of the mucous membrane from the nose cavity into the sinus, self-evident causes.

b. Foreign bodies in the sinus are most often the result of accidents in the course of the at present usual treatment of open maxillary sinus.

c. Traumatism is a cause at all ages. Cases in infants a week after birth have been reported where maxillary sinusitis had been induced by trauma, due to forceps delivery.

d. That morbid conditions of the teeth—molars, bicuspids, and cuspids—and their alveoli are the most frequent exterior causes of open maxillary sinus with concomitant maxillary sinusitis is almost the universal opinion of surgical authorities, and such has been my experience for the past twenty-five years. In adults, in by far the majority of cases, the following is the history of the prodromata of an open maxillary sinus with concomitant maxillary sinusitis: One of the teeth (most often the second permanent molar) becomes diseased by caries of the tooth extending to exposure of the pulp; periodical attacks of pulpitis follow. If the tooth condition is neglected pericementitis and alveolar abscess develop; the abscess may open into the sinus, inducing empyema, or it may open at the labial wall of the alveolus. (The contiguous inflammation of the alveolus causes irritation of the periosteum and mucous membrane of the sinus, and a secondary or sequential maxillary sinusitis is induced, which manifests the following symptoms: Deep-seated discomfort or pain in the cheek area; this, however, is usually referred to the affected tooth, and some pain on pressure over the wall of the sinus. This insidious sinusitis, coincident with the alveolar inflammation, has its focal point at the floor of the sinus, directly opposite the diseased alveolus, and a protective formation of bone occurs at this point, which thickens the osseous floor of the sinus between the alveolus and the sinus cavity. In Dr. Cryer's latest article on the maxillary sinus there is a beautiful illustration of the formation of new osseous tissue at the floor of the sinus in a case of this kind. This thickening of the bone at this point is an attempt to protect the cavity from the intrusion into it of the products of inflammation existing in the alveolus.) If extraction of the tooth is delayed the confined pus, pressing on the walls of the alveolus, interferes with their blood-supply, and its osseous structure undergoes degeneration, by which it is rendered friable. The same change also takes place in the osseous septum between the alveolus and the sinus cavity. Finally the tooth is extracted, and, although the greatest care may be taken in the operation, more or less of the alveolar wall is comminuted, owing to the degeneration of the osseous structure; and after the extraction there will be found an opening into the maxillary sinus.

As a rule, the opening into the sinus is not at first recognized, attention being called to the condition by the patient's complaining of deep-seated pain in the superior maxillary region; that air and sometimes fluids pass from the mouth to the nose, and at times that there is a discharge of pus from the nasal cavity of the side. There may also be a change in the patient's voice. These symptoms will be attended by persistent non-cicatrization of the alveolus, with continued discharge of pus from it. An examination with the probe will, in such cases, determine an abnormal opening into the sinus, and account for the existence of the concomitant maxillary sinusitis. Sometimes an open sinus with concomitant maxillary sinusitis is not preceded by exactly the above prodromata; there may be the following variation: Retained roots of teeth, usually those of the upper second molar, that have been keeping up a chronic pericementitis, with, of course, free drainage at their distal peripheries, which has induced degenerative changes in the osseous walls of the alveolus and the septum between the alveolus and the sinus cavity, with concomitant chronic maxillary sinusitis. These roots being extracted, an open maxillary sinus is present, and there will be a continuance of the maxillary sinusitis.

Treatment.—It is not necessary to detail the methods of treatment resorted to,—of injections of irritating antiseptics and stimulating solutions into the sinus,—or to speak of the usual measures resorted to to keep the opening patent by tents and carefully adapted drainage-tubes. With all due respect, I have never resorted to these measures, as I have regarded them as tending to aggravate and to perpetuate the abnormal conditions. Long-standing cases of open maxillary sinus with continuous discharge of pus, after active local treatment, are too often thought to be due to some undiscovered condition of the interior of the sinus,—ulceration of its mucous membrane or necrosis of its walls,—and heroic measures are resorted to to expose its interior by enlarging the alveolar opening or removing its anterior wall or opening the cavity at the inferior meatus of the nose, for the purpose of freer drainage or of curetting its interior. All such conditions, if present, I claim will have been due to the treatment, and that they might have been avoided by an early, conservative local treatment, with attention to the systemic condition of the patient.

The local and systemic treatment of a given case of open maxillary sinus with concomitant maxillary sinusitis should be determined upon after having appreciated the following conditions:

1. Determine the exact condition of the sinus by the character and quantity of the discharge from it.
2. Ascertain the existence of any peripheral sources of irritation to the sinus.
3. Determine the existence of any systemic condition likely to impair the recuperative powers of the system.
4. Realize the nature of the changed physiological state of the sinus cavity.

1. The character and quantity of the discharge will indicate the degree of inflammation of the mucous membrane of the sinus. Almost invariably it will be found to be in a septic condition, evidenced by more or less pus flowing from the abnormal opening, and at times from the nose cavity of the side; and hence the perpetuation of the sinusitis. To meet this condition the patient should be given a suitable syringe and instructed how to inject the sinus by the abnormal opening. This he should do at least five times a day with a solution of sodii hyposulfitis, one drachm to one ounce of water. As this treatment is carried out the character of the discharge should be noted, as to whether it loses its purulent character and becomes mucus. When the discharge has become mucus, and has continued so for some time, there will be noticed a gradual closure of the opening, with a change from redness and swelling of the edges of the opening, while the discharge was purulent, to a normal tint of the edges of the orifice. Under the latter conditions the syringe nozzle will not enter the opening as easily, and attempted injection is attended by a certain amount of back-flow. Under these circumstances no force should be used to effect injection of the cavity, and as the closure of the opening proceeds the injection should be diminished in frequency, and finally suspended.

2. All existing peripheral sources of irritation should be treated. Remove any roots of teeth present in any of the alveoli of the upper jaw of that side, and keep their alveoli thoroughly aseptic until they are cicatrized. Any teeth in the upper jaw that are dead should be

thoroughly treated by removing pulps, cleaning out root-canals, etc. Any rhinitis of the nose cavity of the side should be treated.

3. If any deviation from the normal of any important function exists, the patient should be placed under a regimen of life and remedies calculated to correct the same, so as to bring about a systemic condition of good health. I have improved many cases and put them on the road to a cure by careful attention to the general health. This latter indication is almost invariably neglected.

4. To realize the nature of the changed physiological state of the sinus cavity we should appreciate that it is a secluded cavity, extremely susceptible to irritation, even by slight modifications of its normal condition; that the only access of air to and from it is at the opening by which it communicates with the nose cavity; that, normally, air entering and leaving it never passes through it by currents; that its mucous surface is continually bathed by a secretion from the large mucous glands of its mucous membrane, which protects it from irritation from the air entering it. With an abnormal opening into it an abnormal amount of air reaches it, and with the opening at an alveolus each inspiration and expiration is attended by a current of air passing through it from nose to mouth, and the reverse with the mouth open. This abnormal access of air in currents dries the surface of the mucous membrane. This in itself is an irritation to the membrane which tends to perpetuate the maxillary sinusitis. A parallel condition is seen, but to a greater degree, where the mucous membrane of the nose cavity is subjected to abnormal access of air, in cases of fissure of the soft and hard palate. In this latter case a chronic rhinitis develops, which induces a permanent induration of the abnormally exposed and dry mucous membrane, thus adapting it to the existing abnormal conditions. Furthermore, with the maxillary sinus open to the buccal cavity, eating and drinking is attended by the ingress of food and drink into the sinus and through it to the nose. These abnormal conditions realized, a most important indication of treatment presents; that of restoring the open maxillary sinus, as nearly as possible, to its normal physiological state of a secluded cavity. To effect this the following measure has been resorted to with success: Close the face of the abnormal aperture by a closely-fitting hard rubber cap, which should overlap upon the labial and palatal surfaces of the gum and be held in place by suitable fixation to the adjacent teeth. This is to be worn during the day, especially when eating and drinking. After each meal it is to be taken out and carefully washed in the hyposulfite solution used for the injections. At night it is to be removed. In the morning, before introducing the cap, after meals, before replacing the cap, and at bed-time, after taking out the cap, are the times when the injections should be made into the sinus.

This cap over the abnormal opening restores the sinus as nearly as possible to its physiological state of a secluded cavity; it prevents undue access of air and currents of air, which cause the mucous membrane lining the cavity to resume its normal moist condition. Irritation removed, the mucous glands resume their secretion. As worn at meals, it effectually prevents the entrance of fluids or particles of food; and it does not interfere with the discharge of pus or mucus, as they readily overflow the cap.

During the past twenty years and more I have treated not a small number of open maxillary sinuses with concomitant maxillary sinusitis of varying periods of duration, and after they had undergone manifold methods of treatment and operative procedures. I never have had a case that came to me soon after the abnormal opening was developed, before having undergone any treatment, that I have failed to arrest the existing maxillary sinusitis and to induce a prompt closure of the abnormal opening. In those that I have not seen early enough, where the opening had been enlarged by operation and the mucous membrane had been subjected to irritation by remedies and the wearing of tents and drainage-tubes, I have succeeded only after prolonged treatment in bringing about a favorable result; and in the cases that had undergone heroic operative treatment I have only been able to render them more comfortable. The experience that I have had warrants me in making a crusade on all irritating local treatment and on all operative measures in cases of open maxillary sinus and concomitant maxillary sinusitis, and in believing that the immediate carrying out of the treatment outlined above will be attended by good results.

The following is an epitome of the treatment to be carried out:

1. Render the sinus aseptic by the mildest possible injections (sodii hyposulfitis one drachm, water one ounce), watching their effect on the discharge (changing from purulent to mucous), and be governed accordingly as to their continuance.
2. Remove all peripheral sources of irritation to the sinus.
3. Place the patient, according to conditions, on a proper regimen of life and course of medication to induce a healthy systemic condition.
4. Restore the sinus as nearly as possible to its physiological condition as a secluded cavity, by a suitable hard rubber cap worn over the abnormal opening.

AN IDEAL METHOD IN CROWN- AND BRIDGE-WORK.

BY GEORGE E. STALLMAN, D.D.S., SAN FRANCISCO, CAL.

THE following mode of procedure in making a bridge or gold crown has been followed by me with a great deal of satisfaction:

My method consists in making metal posts for the bands of the abutments to be imbedded in the cast or model made from the impression. Take for instance a case say from the first bicuspid to the second molar. The teeth or roots for the abutments are ground as usual and the measurement taken. The bands are now adjusted, making no attempt at contouring; merely see that they fit the roots snugly. An impression is taken with the bands in place; also an impression of the antagonizing teeth or a wax bite; the rest of the work is done in the laboratory, as follows:

Remove the bands from the impression and fill the same with moldine, pressing it in close contact between the thumb and forefinger. Now remove the moldine say to the depth of one-sixteenth of an inch from the gingival portion of the band, cut a piece of ordinary writing paper three-quarter inches wide by three inches in length, wrap this paper around the band, and place the ends in the jaws of a vise, drawing the paper snugly around the band.

Pour this tube or mold with Melotte's metal; you have now the neck of the band telescoping over a metal post. Remove the band and also the moldine from the band and replace again on the metal, and return the same with the metal attached accurately in the impression. Pour as usual, the result being a cast of the teeth and gums in plaster with the bands on the metal posts. The bands can now be removed at will any number of times and accurately replaced without injury to the cast. You can also (providing the teeth have been ground sufficiently) contour the bands to correspond with the adjacent teeth. The caps for the band can now be soldered and the dummies set up and articulated and the whole piece removed from the cast, invested, and soldered; after this is done it can again be placed on the cast and proven.

Should one of the abutments be a pin-crown, such as a Richmond, the procedure is somewhat different, though essentially the same. Perfect results can be had, permitting the pin with the base or whole crown to be removed with ease and replaced with perfect accuracy. The method is simple, and can be done in a few moments before pouring the impression with plaster.

Take a strip of annealed copper plate, 42 gauge, say five-eighths of an inch wide by two inches in length. Fold this strip once, and slip the pin between the closed end. With a pair of pliers or with the fingers the copper can be molded in a few seconds around the pin, forming a tube for the same with the ends protruding.

Close the upper end of the tube by squeezing with the pliers, and see that the pin works easily up and down the tube. The tube should inclose the entire pin from the base to beyond the top, and if there are any undercuts in the Richmond band the same should be filled in with moldine; otherwise it could not be easily removed from the metal post.

Now take the paper as before in the case of a band, and wrap this around the base soldered to the pin, the four ends—namely, the two copper ends projecting from the tube and the two paper ends—being brought in the vise (I have devised a convenient clasp for this purpose) and the metal poured between the paper and around the copper tube, no metal coming in contact with the pin at all.

When cool, remove the paper, and with a pair of shears cut off, close to the metal, the copper ends.

The pin, with the base, can now be removed, replaced, and returned with the metal attached in the impression.

In case of an accident during the soldering process, or otherwise, a piece of work involving a great deal of time and patience may be ruined. The model having been destroyed, of course the work would have to be done over again.

As the model in my method has not been destroyed, it permits of the parts being readjusted and soldered as before.

I claim also for this method perfect results with little or no pain to the patient, as the bulk of the work is done in the laboratory.

PROCEEDINGS OF SOCIETIES.

NEW YORK ODONTOLOGICAL SOCIETY.

A REGULAR meeting of the New York Odontological Society was held at the New York Academy of Medicine, No. 17 West Forty-third street, on Tuesday evening, February 21, 1899; the president, Dr. S. G. Perry, occupying the chair.

REPORT OF CLINIC COMMITTEE.

Dr. J. F. P. HODSON. Dr. Wardwell gave us a clinic upon amalgam and its manipulation, and filled several cavities with the aid of thin steel matrices that he tied around the teeth.

Dr. Van Vleck, of Hudson, demonstrated the use of tin and gold; both he and Dr. Wardwell will give accounts of their operations.

Dr. I. FRANKLIN WARDWELL. I prepared five approximal cavities, all running into the crowns. The time was limited, as my patient was in a great hurry to go out of town, and I was only able to fill two. The first was a lower bicuspid, posterior surface, which cavity ran far down under the gum, and was an excellent case to demonstrate the value of the extra thin steel I use, tying the same firmly down at the cervix with several windings of dental floss, which is allowed sometimes to extend farther toward the grinding-surface, giving support to this thin matrix. After the filling is completed, the silk is cut and the steel is carefully withdrawn sideways, leaving the desirable contour without any previous wedging whatever. I have been told it is impossible to get the necessary "knuckling" of fillings in this manner, but I can only say I fear those who feel such to be the case have not used as *thin* steel as my brother and Dr. A. H. Scofield and I have for years been most satisfactorily making use of. The next cavity filled was in an upper first molar, anterior surface. Here the tying of the steel was easily accomplished, and, as considerably more surface was exposed, it was a good case for all to see. Of course, one readily recognizes the value of the matrix in these cases, as the alloy can be so easily introduced and thoroughly condensed, using sufficient pressure without disturbing the filling. I am sorry there was not sufficient time to fill the rest of the prepared cavities, but I have since done so, and, if desirable, will ask this patient to present himself again, as I think it a good case to illustrate what can be done *without any* wedging.

Dr. CHAS. K. VAN VLECK, of Hudson, N. Y. The clinic given by me this afternoon on Dr. Hodson was to demonstrate the manipulation of gold and tin at the cervical border of an approximal cavity.

The gold and tin cylinders were used to fill about half the anterior cavity of the first lower molar. The work was then carried to the crown with very soft and very close-rolled gold cylinders, which are made for me by Mr. Rowan. The crown was then finished with cohesive gold in the usual manner. The soft gold cylinders will lie almost as dead as tin.

Dr. W. W. WALKER. I would like Dr. Van Vleck to tell us why he uses the combination of gold and tin.

Dr. VAN VLECK. In this particular case I used them because Dr. Hodson wished me to; but at the cervical borders the gold and tin in this way has served as a remarkably good preservative agent. Experience has demonstrated to me that it is very lasting. There is an oxidization that takes place in the tin which seems to make it better than anything else for this purpose.

Dr. JOHN I. HART. Would annealing this gold that you use in the form of cylinders cause it to become cohesive?

Dr. VAN VLECK. Yes, it would become cohesive, but with the close rolling it would become almost uncontrollable under the instrument. It would not go to its place easily.

INCIDENTS OF OFFICE PRACTICE.

Dr. JOHN I. HART. I have been using the hydrochlorate of cocain and sulfuric acid, making use of a saturated solution for practicing the immediate extirpation of exposed pulps,—not a creamy mixture, but one that was fairly fluid. I have only used this in four cases, two laterals, an upper cuspid, and a central. The pulps had manifested no irritation, so of course they were not so irritable under the pricking process, to work the medicament into the pulp, as they would have been had they been congested. The resultant pulp-tissue is so broken up by the pricking of the sulfuric acid and cocain into its substance that it could not be removed in the string-like form which we are accustomed to, and the broken-down tissue is reduced by the sodium and potassium into a soapy material, which is readily removed from the pulp-chamber and root-canal.

None of these cases up to the present time have manifested any periosteal irritation. Two of the roots have been filled permanently, and the other two have remained a week with a floss silk and oil of cloves dressing, and they will probably be filled in a few days. The removal was made so soon after the exposure that it seemed to me to be rather an advantage in practice.

The PRESIDENT. How long a time was required in cutting out?

Dr. HART. One lateral I cut out in seven minutes, in the mouth of a female patient who is ordinarily somewhat excitable, and she did not know the pulp was being touched.

In using this method in a central in the mouth of a physician yesterday, he said it pained him some, but not much more than cutting healthy dentin over a pulp that was not congested. The other cases did not manifest any particular pain. They did not resent it in any manner, shape, or form, and there has been no subsequent periosteal irritation in any of the four cases.

Dr. Hodson. I would ask Dr. Hart if he left the medicament in the pulp for any length of time before he did any of the pricking?

Dr. Hart. As soon as I applied it I pricked it right into the pulp, and in this respect it acted differently to using the cocain alone. In the hydrochlorate of cocain it requires some few moments to get the absorption; with this the action of the sulfuric acid seems to devitalize the tissue immediately, and allows a forward progress continuously until all the pulp is broken down in fine threads.

Dr. F. T. Van Woert. Would you not get the same result with sulfuric acid without cocain?

Dr. Hart. I think there would be the difficulty of holding sulfuric acid without some menstruum in a given position. It acts as a vehicle, and it is held against the pulp, and does not flow generally out around the tooth.

The paper of the evening was then read by Dr. Wm. J. Morton, of New York, entitled,—

Pressure Anesthesia.

Mr. President, and gentlemen of the Odontological Society, I need not say how deeply I appreciate the honor of having the pleasure of being with you this evening and taking part in these discussions, which tend in the end to ameliorate the hard duties of professional life such as both you and I have to meet every day.

Think of the charming goal of which we are in pursuit,—to relieve the patient of pain. Then think of the equally agreeable effect upon the operator, to relieve himself of the strain of seeing the patient suffer pain, for I am sure you must feel that pain.

Now there is a humorous side to obtaining any new principle in medicine, just as in anything else. I heard a dentist remark a few minutes ago that since these new things came up, if you will excuse my levity in repeating what he said, it had played "the deuce" with his patients. I suppose he meant he had been experimenting upon them.

Now, my doctrine is something like the doctrine of an acute observer who noticed that when two cats began disputing on his roof, instead of annihilating each other, as he hoped they would, more cats came on the roof. Now that is the effect I would like to see from this new subject. I want to see more cats come on the roof, and I want to hear some other person say that he also has experimented.

I believe that out of all this agitation and thinking there will come in the end some simple, easy means of producing anesthesia of sensitive dentin, which we are now particularly interested in, that will be so easy that you will all wonder why you have not always done it.

I think we are in what might be called an agitatory stage of the subject. And no matter how old I get, I want to retain that young enthusiasm that wants a try at each new thing. I want to see obtunding, whether by cataphoric anesthesia or any other means, practiced until we are all settled as to which is a best and easiest way.

To-night we are to have, I understand, simply an informal conversation; I yielded to the extremely persuasive powers of one of your members, Dr. Walker, who overcame all my objections, but it was on the understanding that you would do a great deal more of the talking than I. Some of what I shall say is, after all, in a certain respect retrospective, as well as antrospective, if there be such a word. There is a little historical reminiscence back of pressure anesthesia. What, for instance, do we mean by pressure anesthesia? Simply that something exerts a pressure,—some obtunding or anesthetizing agency is forced or finds its way into those dentinal tubules and there produces anesthesia. Cataphoresis was pressure anesthesia in an electrical sense, for electricity is pressure, and that is all it is. Cataphoresis, so called, using the positive pole of the battery to exert an electric pressure, was therefore pressure anesthesia. That we will not refer to to-night. Cataphoresis is very much alive. No alternative procedure of so simple a nature can die out of practice, for cataphoresis *will* produce numbness of sensitive dentin, and there will always be cases where you can employ it, but it is also a fact that a simpler method would be desirable. This simpler process we are to-night in search of.

When, four years ago, I stood before the meeting of the First District Society, and we went over the ground of cataphoresis from A to Z, it was a difficult subject because new,—difficult to present, difficult to receive and grasp,—and, moreover, there are always certain technical difficulties that will stand around cataphoresis, but at this day great advances in the practice have been made.

If, however, possibly there is some simpler method in say twenty per cent. of the cases, we ought to have it in view, and by and by one method will be put against the other until we settle down to some fixed practice.

I wrote a little book on cataphoresis in which I went over the ground fully, and in that book I put one short chapter, just a page and a half, entitled "Pressure Anesthesia." That was an anchor thrown out to the windward about two years ago. Fond as I was of cataphoresis, there still clung in my mind this idea, that simple mechanical pressure, or the pressure of gases and vapors, might finally be used to convey anesthetizing material into the substance of the dentin, and so I put in that chapter.

This idea I had also brought forward at a meeting in the White Mountains, in July, 1897, on the subject of pressure anesthesia. The discussion was published in *Items of Interest*.

With your permission, I will read briefly a part of the chapter above referred to.

"*Pressure Local Anesthesia of Soft Tissues and of Dentin.*—It has become a well-established practice in dental surgery to introduce into the cavity of a tooth for the purpose of bleaching it, when the cavity admits of it, a twenty-five or other convenient per cent. of peroxid of hydrogen, held on a pledget of cotton and sealed in. It is maintained that, in addition to the simple process of inhibition, the cocain is forced into the substance of the dentin by pressure due to the evaporation of the ether. In this manner teeth can be successfully bleached to an extent not possible if the pledget of cotton holding the bleaching fluid is not sealed in, except when electricity is used. It occurred to me that if this same principle could be applied to a sulfuric ether solution of cocain that we should possess an extraordinarily simple method of anesthetizing the soft tissues in general and sensitive dentin in particular,—a method so simple and sure that it would sweep away all the labor that has been expended in a certain class of cavities, upon the introduction of cocain by electricity. Since cocain hydrochlorate would not dissolve in sulfuric ether, I dissolved it in guaiacol (making a ten per cent. solution), and then found that I could add equal parts of sulfuric ether to the solution without precipitating the cocain.

"Experiment 1. June 23, 1897.—Taking about twenty drops of the above solution, I put it in a small test tube, and inverting the tube, I held its mouth firmly against the skin of my forearm. At the end of five minutes, removing the tube, I tested the area of skin comprised within the circle represented by the mouth of the tube, and found that it was perfectly anesthetized; it remained anesthetic for five minutes, and then gradually recovered sensation without any hyperesthesia to speak of and without injury to the skin. Further experiments substantiated this result.

"I have also made some experiments with air pressure by connecting to a rubber tube, itself in connection with a cylinder of compressed air and a gauge, a hollow needle having a shoulder near its extremity. Where the cavity permits of it, the solution of cocain is introduced upon absorbent material sealed in with plastic material, and then the needle thrust through it as far as the shoulder will permit. At this point the air pressure is allowed to act. By the use of this instrument local anesthesia is promptly obtained. Dr. M. L. Rhein has now an instrument of this description in his possession, and will as soon as possible make further experiments upon dentin and report some cases."

These two publications placed this question of pressure anesthesia fairly before the dental profession two years ago. Since that time I have given very little thought to the matter. I had reports from some of the gentlemen very early. I had a report from Dr. Van Woert, of Brooklyn, who wrote to me he had made several experiments, and perhaps we will hear from him later on where he used these experiments.

Beyond a few more such reports, I hardly knew what had come from that idea, until within the last few months I observe that the profession has become largely interested in pressure anesthesia produced by ethereal solutions of cocain as I had suggested and demonstrated. If on account of its odor it is not desired to use guaiacol as an intermediary to get the otherwise insoluble cocain salt into solution with ether, any other intermediary, such as, for instance, alcohol, may be employed. How the solution is effected is a minor question, once the fact having been established that it could be done and that the solution would act.

What, then, I propose to present for consideration to-night is new to our profession,—to make practical applications of *continuous* air pressure for driving any substance through the dentinal tubuli, so that the substance mixes in and through and, being medicinal, like cocain, produces an anesthetizing effect. This same view would be true of pressure if you object that the air would not find its way easily enough through these tubules. Hydrogen will find its way; nitrous oxid would find its way under pressure. In fact, you have the whole realm of gases as well as air. But I will confine myself entirely to air, because I have experimented mostly with it.

I am first going to pass around this bulb. You see it is the usual one used for the Pacquelin cautery, for a Davidson syringe; in short, the ordinary one used in dentistry, which you blow up and produce a continual pressure. To its tube is attached a little ebonite cup about one inch in diameter and one-eighth of an inch deep. This is not for dental use, but I show it by way of illustration. Suppose that I wish to take guaiacol and cocain to anesthetize the skin of the arm. I take a ten or twenty per cent. of hydrochlorate of cocain in guaiacol, and if the skin is to be anesthetized, smear it upon the arm, place this little cup against it, and blow this bulb up, and hold or tie it there. You have a continued elastic pressure going on here; you can hear it escaping here as I raise the edge; there is quite a pressure. It is a question of pressure versus pressure. There is the blood pressure on the one hand, and the air pressure on the other. If the air pressure is greater than the blood pressure, then of course the blood is going to retreat into the mass of the skin and the anesthetizing solution will follow it, and you get an anesthetized spot which you can prick and cut without pain. This I have demonstrated beyond question in actual practice.

Now we will see how to apply this to dental practice. Let us illustrate on the blackboard. We have a source of air pressure, a rubber bulb, a cylinder like a bicycle pump or an air pump,—any source of air pressure you like. We have our anesthetizing agent; this is a solution of cocain in sulfuric ether, though other solutions may be found to act equally well or better. But the ether solution seems to have a special advantage, and I think it is because the sulfuric ether holds the cocain and finds its way down into the tubules, evaporates, leaves the cocain, and the cocain then takes up a partnership with the fluid lymph of the tubule. The sulfuric ether is what enables the cocain to join in with the lymph of the dentinal tubuli. This also I conceive to be the action of the guaiacol when this is made use of with cocain.

We must also take into account the devitalizing effect of pressure upon the sensitive structure of the tooth; but there is another important truth to consider. As soon as you leave the arterial system and come down to the capillary system, which we represent here by "C" [illustrating by means of a diagram plotted to scale], there is at least one-fifth fall in the blood pressure. In the capillary system this blood pressure comes about to equalize the pressure of the venous system. The actual blood pressure then, when it comes to the capillary system, is very small. The walls of the capillaries have no particular strength, and the blood circulates about in them under very little pressure. When, therefore, the arterial pressure reaches the pulp-cavity of the tooth it is practically a capillary pressure. That means that you have got very little resistance to overcome by means of your artificial pressure, and this is just what is wanted.

I make here a very rough outline of a tooth which has a cavity in it. For convenience, we will only represent three dentinal tubuli. There is your capillary pressure in there [illustrating on blackboard] at that end of the line. I am going to set up against it an air pressure. I will pass around various teeth that I secured to-day, with cavities in them, fitted with pieces of rubber tubing. The tubing is small, thin, and highly elastic, such as all are familiar with. Pass the end of a rubber tube like that over the crown of the tooth, and ligature it tight with a bit of floss silk around the neck of the tooth. Then attach the other end of this tubing to your source of air pressure. At this point you have a little stop-cock. Apply the pressure and allow it to act continuously.

If you set up say an ounce pressure, that ounce of pressure is exercised; the cavity contains the anesthetizing material upon absorbent cotton; put on pressure with the air bulb, and that pressure is translated into a movement of anesthetizing material into the tubules.

The air bulb now acts continuously by virtue of its elasticity, and you ask the patient to sit down ten, fifteen, or twenty minutes, and a continuous effect is being produced by driving the substance into this sensitive dentin. We all know how simple the principle is of hydraulic pressure. A very small tube, carrying a jet of water flowing a long time, will exert an enormous ultimate force.

In the case of the instrument I passed around, the familiar pair of rubber bulbs, about five minutes was enough to drive the anesthetizing agent into the skin. In the case of sensitive dentin it might require from that to fifteen minutes.

In fact, the whole process is so utterly simple that it requires very little explanation; it seems that all we have to deal with here is the internal blood pressure,—namely, the capillary pressure within the tooth, and the forcing into the sensitive dentin of fluids by reason of the artificial pressure.

I have here a diagram which illustrates what I have said, and which I will pass around. I have gone over the ground a little hurriedly, but the method in its simplicity speaks for itself.

Unlike cataphoresis, where there is foundation after foundation to be laid, here in this pressure anesthesia we are treading upon very familiar ground, and if it should prove to be practical in a certain number of cases we should be making a very considerable advance.

I myself believe that practice will lead to several procedures very simple and easy, and that we have got to be familiar with these several procedures.

Now, if you use a sulfuric ether solution of the hydrochlorate of cocain without sealing it in with rubber cement, as I in the beginning advised, if you use it without sealing it in or without putting up against it any instrument to retain the ether vapor, then you have still, to a certain extent, a pressure anesthesia by reason of the packing, but not exactly in the sense that I first meant it.

What I present new to-night, and beyond the record, is the simple fact represented by this tooth which I have passed around,

—a tooth upon which has been passed a rubber tube, which in turn is connected with a rubber bulb, maintaining a continuous air pressure. Anesthetizing material is placed in contact with the sensitive dentin of the tooth thus arranged.

I am sure that enough has been said to open and pave the way for further discussion to-night, and I hope we shall hear from some of those who have had experience in this direction. I can only hope that this simple procedure may appeal to your practical sense, and that it may add to and enhance the value of a great number of experiments that I personally know are taking place in your profession in this matter. Probably more of your number are experimenting in this direction than you have any idea of. At this point I will close what I have to say with an apology for my very elemental presentation of the subject.

Discussion.

The PRESIDENT. Before calling on Dr. Van Woert to give an exhibition of some of his experiments, we will hear from Mr. Evans from the chemical standpoint of this subject.

Mr. EVANS. Thank you, Mr. President, and gentlemen, for this opportunity to answer a few questions. In the correspondence about ethereal solution of hydrochlorate of cocain some questions have come up which need an answer. It is much easier to ask a good question than it is to give a good answer.

The subject has attracted a good deal more attention than any one could expect, and it has been a matter of interest to all who have looked into it that some of the results that are supposed to come only to the chemist were known long ago to men who had no knowledge of chemistry whatever.

For a number of years the natives of Bolivia and Peru have been accustomed to chew coca leaves for the purpose of warding off hunger and fatigue, and in view of the anesthetic properties of the active ingredient many have wondered how these people manage to consume the leaves without the production of excessive numbness of the mouth and throat.

Light is thrown on this subject by the discovery of the fact that prior to mastication the Bolivians mix the coca leaves with lime or ashes. Our knowledge of the chemical composition of the leaf enables us at once to furnish a satisfactory explanation.

Cocain exists in the leaf in a soluble form in combination with cocaic and other organic acids. The addition of lime or ashes (containing alkaline substances) decomposes the salts of cocain, liberating alkaloid cocain, which is practically insoluble in water or the mouth-fluids. Consequently, considerable quantities of the leaf can be chewed without experiencing the characteristic effects of cocain. When the juice, however, enters the stomach the acid fluids of that organ at once redissolve the cocain alkaloid, which there exerts its peculiar physiological action. In this way the pangs of hunger are allayed by the production of anesthesia of the stomach, without interfering with the mouth or throat by producing an anesthesia there. This is in itself an answer to one of the questions in connection with the addition of an alkali to a solution of hydrochlorate of cocain. But to deal further with that particular subject I have collected additional data.

I have been asked why we do not add caustic potash to vapocaine. In reply I would point out that cocain hydrochlorate, like all alkaloidal salts, is decomposed in the presence of alkaline substances, cocain alkaloid and a chlorid of the alkali being formed.

If we dissolve some hydrochlorate of cocain in water and add a little solution of potash, a white precipitate of cocain alkaloid is at once thrown down. Cocain alkaloid is insoluble in water, but if a little ether be added to the cloudy solution and shaken up with it, the solution at once becomes clear on separation of the ether and water. This is due to the fact that the alkaloid has dissolved in the ether.

A similar result is apparent when caustic potash is added to vapocaine. The solution will remain clear, owing to the solubility of the cocain alkaloid in the ethereal fluid, but, nevertheless, a portion of the cocain salt has been decomposed and the solution is that much weaker in its anesthetic properties. The anesthetic power will thus be in inverse proportion to the amount of alkali added. Cocain, chemically, is methyl-benzoyl-ecgonin, and undergoes decomposition with great facility. If placed in contact with acids or alkalies, or even if heated in water, decomposition occurs. Methyl alcohol and benzoic acid are split off and ecgonin formed, which is the base of all the coca alkaloids. Such decomposition is very likely to occur when caustic potash is added to vapocaine.

That is an endeavor to answer from a chemical standpoint a portion of the questions.

Now, I have been asked how many grains to the fluidrachm is represented by fifteen per cent. Fifteen per cent. will give you nine grains of hydrochlorate of cocain to the fluidrachm, while twelve per cent. would be seven and a quarter grains about to the drachm. There is twenty per cent. less cocain in a solution said to contain seven and a quarter grains to the fluidrachm than there is in vapocaine, which contains nine grains to the fluidrachm.

Dr. Hodson. Mr. President, I would like to ask Mr. Evans to say plainly in detail if the addition of potash to the cocain and ether absolutely destroys the anesthetic effect.

Mr. Evans. An ethereal solution containing fifteen per cent. of alkaloid cocain would represent much more cocain strength than a solution of fifteen per cent. of hydrochlorate of cocain, because hydrochlorate of cocain is made from the alkaloid, but an ethereal solution of fifteen per cent. of alkaloid cocain can be put almost all over your tongue without producing any anesthetic effect whatever, while a small portion of a weaker hydrochlorate of cocain could not be applied without producing profound anesthesia; and just in proportion as you add to a solution of hydrochlorate of cocain an alkaline substance which will again convert it to an alkaloid, in that proportion it will deprive it of its power of producing anesthesia.

I will say that a solution of alkaloid cocain will not produce anesthesia, while a solution of hydrochlorate of cocain is an anesthetic solution.

Dr. F. T. Van Woert. Mr. President, and gentlemen, to say that I am interested will hardly express it. I think that I should acquaint you all with the fact that the first intimation I had of this particular subject was given me by Professor Morton in the White Mountains a year ago last summer. During a conversation in the corridor of the hotel he gave me the suggestions, which I put into practical application immediately on my return home. The misfortune is that in a large majority of cases it is not applicable, for this reason: to get what Professor Morton wants, the cavities must be so formed that it is possible to absolutely seal into them the preparation to be used. Whenever this was practical, it always operated as perfectly as by means of cataphoresis.

The cases presented by Dr. Morton are theoretically very nice, but, unfortunately, most of the cavities we have in teeth are open surfaces that are unequal in their margins, and they are located in places where it is impossible to get anything to seal them.

I tried every means known to myself and others with whom I was associated who were familiar with dynamics and general mechanics, and I could not find out how to get an even pressure upon them for the purpose which I wanted.

I will say I am firm in the belief that if the pressure can be maintained you will get exactly the results that Professor Morton has claimed. That has been my experience. Later I found that by introducing a solution of cocain with an atomizer under a heavy air pressure I could practically get the same results, but I found in this application that to obtain the highest efficiency it was absolutely necessary to keep the pressure at one fixed amount. That is one of the reasons that I had the Cleveland Forceps Company send up an air pump here, that I might show you how I use it.

The preparation of cocain I favor most is a thick paste, made by mixing cocain and guaiacol in crystalline form.

You can see it forms a thick gum. The guaiacol can be had in crystal form, the same as carbolic acid. In the proportion of five of cocain to two of guaiacol it makes a very stiff and convenient form of applying cocain to a cavity. Whenever I can get the patient in a position to make application of that preparation of cocain, I almost invariably get the results that I seek.

I am inclined to get back to first principles, and feel that notwithstanding the desirability of something to produce insensibility there is one reliable stand-by that we have,—namely, that of good, sharp instruments and careful manipulation. Further, if a study of the surfaces of instruments, and a study of the speed at which burs should be run in proportion to their size is made, you will get much more satisfactory results than with burs placed in an engine all sizes and run at any speed. A small bur, of course, should be run at a higher speed than a large one, but whatever bur is used it should be selected with as little frictional surface as possible to produce the results wanted, and the results following will be a reduction of the pain to a comfortable minimum.

A wheel bur will cut as much, with less pain, as a round bur. A round bur has the addition of its own surface in connection with the whole of the cavity, and it inflicts very much more pain. That I have proven to my own satisfaction sixteen or eighteen years ago.

I seldom use wheel burs, because I think a multiplicity of instruments in the office is to be avoided. A few sizes of round burs will answer the purpose, run at a proper speed.

Do not misunderstand me, in believing that I am not resorting to the different methods. I believe the only reliable thing for the use of the general practitioner is good, sharp instruments, a good steady hand, and a little bit of sensible talk to the patients, if they are nervous.

I believe the subject presented to you by Professor Morton is one that you ought all to take home and experiment upon. It is something you ought to find out for yourselves. It is worth all and more than it has cost him to present it, but I wanted you to know what my experience has been,—my failure and my success.

The PRESIDENT. Dr. Van Woert, you did not give us a practical description of the compressed air apparatus.

Dr. VAN WOERT. The first difficulty I had in the use of compressed air was that with an ordinary hand pump, or tank pumped up by hand; there was no means of controlling the pressure. If the air is controlled from this valve it is a very difficult thing to maintain it at an even pressure, because of having to open or close the valve. To keep up the even pressure we have here an equalization valve, or a regulating valve, which can be set for any pressure.

I am using four of these in the office, and I have no trouble with them whatever. I can set the equalization valve at any pressure I want, and it is registered on this side, so that I can see just what the pressure is. If I wanted pressure anesthesia I would set it at twenty-five or thirty pounds, and it would run at twenty-five or thirty pounds until I had exhausted the tank, if I had no means of replenishing it.

If I wanted to use it for ordinary working purposes, I would run it down to five or six pounds, and by simply turning that screw up or down I can get an even pressure at the outlet without further trouble. What I had this tank sent here for was to show you something of the application made in other directions of compressed air rather than anesthesia.

Dr. MORTON. Mr. President, may I ask the speaker just how he applies the air?

Dr. VAN WOERT. By isolating my tooth. I take a Davidson spray atomizer and put the solution of cocain into that, and just drive it into the tubuli with that force.

For a young person, a child for instance, I would reduce the pressure, and the older the person was the more I would increase the pressure. The idea was to maintain the even pressure.

Dr. MORTON. Do you take different solutions of cocain?

Dr. VAN WOERT. I use ten to fifteen per cent. aqueous solution. I could not use a low pressure without sealing; I would lose the pressure unless I could seal it. I would like to know if there is any way by which you can maintain the pressure if you lose it through any leakage, because it will go through the place of the least resistance.

You could not force a medicament through, because the resistance is so high there that it will seek the easiest route out, and my experience of it was that wherever I did not get perfect sealing I had a failure. It might have been my fault in manipulation; it was not the fault of the medicament.

The PRESIDENT. Gentlemen, I think it is three months to-night since the vapocaine was first spoken of in this society. I wish we might have a fuller expression as to its practical effect. We know more of it now than we did then.

Dr. VAN VLECK. I have used vapocaine with a great deal of success. By placing it in a cavity and tying a rubber-dam around it, leaving it there for the heat to expand, I have had better success than in leaving it exposed to the air.

Dr. J. BOND LITTIG. I do not know that I can add much to what I said in the first place. I have used it frequently, with varying success. Sometimes it would act beautifully, at other times I would find great difficulty; sometimes it causes great pain, and sometimes it does not, so that I am not really sure as to its action in every case yet until after I have tried it.

Dr. TRACEY. I have noticed that the bottle, when it is first opened, seems to give better results than it does when half empty, and I would like to ask Mr. Evans if it is a preparation that loses its strength by standing.

Mr. EVANS. The cocain strength of it increases as the ether evaporates, and we find fifteen per cent. is about the most satisfactory solution. We were quite a long time in arriving at what would be a satisfactory strength. I have no doubt that if it is properly corked it would act better, as it is in this way protected from evaporating.

The PRESIDENT. In my own use of it I am quite sure such is the case, because some of the bottles that Mr. Evans first brought me after a while showed a deposit of the cocain around the cork, and using from several of these bottles I was disappointed. I met with my first failures from those, and I am now inclined to think that in the use of this material we have all been expecting it to act too quickly. We expected to get a good result in a minute or two. I am convinced a very good result can be produced in a few minutes if one will be patient. I have not met a single case where I have not been able by patience to produce a marked effect on the tooth, and make it bearable within a few minutes. I would like some explanation of why it acts so quickly in some teeth and slowly in others.

Mr. EVANS. Those who are patient enough to apply some of the solution without drying the cavity, and then cautiously remove portions of the material resulting from decay, find that by doing so they have practically removed the obstruction in front of the dentinal tubuli, and permitted the ethereal solution to come in contact with the fluid in the tubuli.

Dr. Walker suggested to me that in some of the cavities he had found it an advantage to use a drill, making a few openings with a very small drill, and then applying some of the vapocaine. It does seem reasonable that the acid-forming cause of decay should throw a calcified deposit into the openings of dentinal tubuli which would prevent anything from entering them. The distinct advantage of having cocain in ether instead of water is a thing that should be borne in mind by every operator. Now you are not compelled to force an extraneous fluid into the structure of a tooth to remain there, but merely to come in contact with the lymph, when the cocain immediately gives the "mitten," so to speak, to the ether, and makes love to the aqueous fluid, which we suppose to be a form of lymph in the dentinal tubuli.

The PRESIDENT. I have repeatedly found that when I got the outer shell removed the medicine was more quickly absorbed and more quickly brought the tooth under its influence. I have used it in wet cavities when it was just as reliable as it was in dry ones. Why I cannot tell you, but I have had excellent results, because I have been forced to use it quickly.

Dr. M. L. RHEIN. I want to revert in the discussion on this subject to remarks made by Professor Morton in which he has gone back to his first steps and his first ideas on pressure anesthesia. I should not remain silent when I was perhaps more aware than any one else of his first experiments in the line that he has presented to us this evening.

I have omitted inadvertently to bring with me the first instrument that he suggested for this purpose; I have it in my operating room, and Professor Morton spent some time with me before the meeting at the White Mountains endeavoring to solve this problem.

We met all the objections that Dr. Van Woert has illustrated to us this evening, and the main object that I have in saying what I do is to corroborate Dr. Morton. It is over two years since Professor Morton started his experiments with pressure anesthesia in this manner on dentin. He started them, as far as I know, in my own office, and they were as satisfactory at that time as I have been able to get subsequently by the use of the vapocaine or any of the ethereal solutions of cocain that I have used.

I have personally been interested in the local anesthesia of dentin as long as I have been practicing dentistry, and have spent a great deal of time endeavoring to solve this problem. I told Professor Morton at that time that the results that we achieved were unsatisfactory to me. They were unsatisfactory as long as I could not produce complete anesthesia of the dentin. The partial relief of pain in certain cases was entirely unsatisfactory to me, because I take very much the same view that Dr. Van Woert has taken this evening. There are to me two classes of cases: one where it is possible to work for the patient without any anesthetic,—where, by means of the sharpest kind of instruments, and those selected with some care, the sensation produced does not greatly disturb the patient.

There is, however, a very large class of patients to whom the slightest sensation about the dentin is an agony that they can compare to nothing else. No partial cessation of that sensation is satisfactory to them. They want their work done so that it is not a shock, but something that they can bear with equanimity. They require complete anesthesia of the dentin. They want to feel, when the operation has once commenced, that they are secure in the chair against a recurrence of sensation until they leave. I have not been able to get such result with anything except the cataphoric application of the hydrochlorate of cocain. It is one of the greatest surprises of my practical experience to find how man after man has given up the use of the cataphoric apparatus for this class of patients. I do not want to be understood that I use cocain anesthesia every day of my practice. It is possible that some days I have been obliged to use it several times, and then some days I have not used it at all. In the course of three years I have known of but one case where I have failed to produce an absolutely satisfactory result by cocain applied cataphorically, and in that case the patient was of such a hysterical nature as to leave me in doubt as to the effect. Whether there was not anesthesia in that case I have never been able to satisfy myself. The results are so satisfactory where I find it necessary to obtain complete anesthesia that it is a mystery to me that men who have used cataphoresis have been willing to give it up for something that I admit alleviates the pain, but that does not remove the sensation.

This entire discussion has been very interesting to me from another standpoint; that is, the acidity of these solutions. I remember when Dr. Van Woert spoke to us about this solution of sulfuric acid some years ago. Wherever acid is used it is necessary for us to take a great deal of care, in order to be sure that we do not injure the enamel margins of our cavities. The injurious effects of these acid solutions have long been obvious to me. I have felt the importance of them so much that I have felt it a necessity, even in the cataphoric application of cocain, to take the most careful means to avoid leaving any of the enamel margins in such a shape that they might be affected by the slight acidity of the solution.

I am sure, as I have stated at a meeting in Brooklyn, that tooth-substance after cataphoresis has been applied can be cut more easily than before on account of the acid condition of the solution. As far back as 1884 I used the solution of cocain in sulfuric acid. This was not my suggestion. I did not use the hydrochlorate; it was a plain alkaloid form of the cocain, and it was the suggestion of Dr. Herbst, of Berlin. Some may recollect his giving the formula when he was in this country. It was very efficacious, but I abandoned it because of that same detrimental effect that I found it had on the teeth; it was too injurious to be persisted in.

It was my experience in using different forms of cocain, as well as aqueous solutions of cocain, during 1883, 1884, and 1885, that leads me to give a suggestion in answer to the president's query as to why there is this difference in the effects of vapocaine. In some of my first cases of simply placing an ordinary aqueous solution of the hydrochlorate of cocain in cavities, I was amazed at the success I had. It was marvelous. Simply leaving them on a pellet of cotton seemed to produce the most thorough anesthesia. But when I commenced to get case after case where I could not get that result, I came to the conclusion that the ones that were so successful were those in which the consolidation of the inorganic constituents of the dentin was not up to that degree that we know of as hard tooth-structure.

I have made some experiments with vapocaine in some of my patients' mouths, where they have an especially hard character of dentin, where I could get absolutely no results at all. I do not want to say the slightest thing to deter any one from following up the experimental line in this respect. I myself intend to follow up the same line that Professor Morton has demonstrated to-night with the apparatus that he has suggested. I can see in it the most wonderful and simple ingenuity, so wonderful that I cannot conceive how I failed to think of the same thing myself, and I do not see how Dr. Van Woert could find a barrier to the use of this apparatus. It no more exists with this than with the cataphoric machine.

Where the cavity extends far beyond the gum, it has been my practice to use the Fowler soft stopping, and pack it around so that we get some distance above the gum-margin. In addition to that, when the rubber-dam is around the tooth, I flow a solution of gutta-percha around the rubber-dam, and that completely seals it around the tooth and to the margin of the soft stopping that is in the cavity. You have a plain, simple exposed cavity then. If you adjust one of these tubes in this way you simply adjust it above that point, and you can then go to work and apply your chloroform solution around the end of that rubber in the same way that it is applied around the rubber-dam, and you are bound to have a perfect isolation, impossible for any air to escape.

Dr. MORTON. There is a great deal that can be replied to, but as the hour is late I cannot well reply to all of it. Among other plans in this pressure anesthesia, not only did I propose to seal in a cavity, but I proposed various little instruments which may be pressed up against the cavity; for instance, in a cavity like this [illustrating on blackboard] you put in your solution and some cement over the top. You have a little perforated plate the size of the opening. You put on your air pressure here. As I suggested before, the air pressure will cut its own way through the cement through a puncture maintained by the instrument. The air comes through the handle. That could be done in any tooth.

I suggested quite a number of these instruments, and I had one made, and that is the instrument Dr. Rhein refers to. They might be little rubber bulbs which the air might go through, little plates of metal, etc. It does not need so much pressure after all. I think Dr. Van Woert was under the impression that it required a great deal of pressure.

Dr. VAN WOERT. The pressure was not under sealing. It was open.

Dr. Morton. The open pressure would be a different matter. That is the manner, as Dr. Van Woert has explained, in which he has been using air pressure. I understand it is spray pressure. I do not know whether anybody ever tried a single jet or needle spray.

I remember a man once came into my office and showed me a needle spray, a single, even spray of water. He offered to penetrate my finger with it. I did not want it penetrated. If you take a single jet like that, the force of this little needle spray would bore a hole into the dentin, if it is strong enough. One of these sharp needle sprays might make patients just jump out of the chair in the way that Dr. Walker described about that drill.

Suppose we had a needle spray that would bore a hole through my finger with an aqueous solution of cocain. One would equally bore the dentin. This, of course, would be impractical, and is only here mentioned for illustration.

As to the guaiacol and cocain, I think guaiacol is the best myself. Probably it is an esthetic, not an anesthetic, question, for as an anesthetic the guaiacol and cocain combination is of great efficacy.

I do not believe anything will ever be found so available to mix with cocain as guaiacol. I think that a "cream" of guaiacol crystals and cocain is undoubtedly the most powerful local anesthetic known to science to-day. That combination I myself discovered, and I believe in it. The only thing against it is a disagreeable odor. I always use it to produce local skin anesthesia.

Somebody said that guaiacol was ninety per cent. creasote. This is not the fact. Guaiacol is one of several derivatives from beech tar creasote. You have a comparatively safe drug in guaiacol as compared with creasote. If you do not believe it, take some creasote and put a drop of it on your arm. It will cause a most painful burn, and guaiacol will not. The guaiacol is comparatively innocuous and bland.

There is often a great difference in success in all cocain preparations. In my clinical work at the Post-Graduate School and Hospital I always use fresh solutions of cocain. Everybody knows that cocain deteriorates, and the difference in experience may be whether you use fresh cocain or not. I have had ten and twenty per cent. solutions of cocain absolute failures, and the only reason was that I had taken an office solution, but if I make up a fresh solution I have success every time. I never make experiments with solutions that have been kept any considerable time.

Dr. Van Vleck said a very practical thing when he spoke of tying that rubber-dam around the tooth. When the case does not permit of using the tube as I described, you could put a rubber-dam on. I imagine most of you would say a rubber-dam can be put almost anywhere.

There is your cavity, there is your solution within the cavity, ready to act, here is your rubber-dam. Bring it right down and put your cement on it, tie it there, a close bag around the tooth; then admit the continuous air pressure.

Dr. HODSON. You don't need any cement if you tie it tight.

Dr. MORTON. Simply draw the rubber-dam around. Now you have an elastic bag around the tooth, and by inflating it and keeping it inflated you have the continuous air pressure.

Dr. HODSON. The only thing I would suggest would be that it would not bear much pressure without leaking, as the rubber-dam is so thin.

Dr. MORTON. It does not require much pressure, but only that a continuous small pressure should be continued a considerable time.

I am very much pleased to hear of the success of these ethereal solutions of cocain. When I suggested and demonstrated their use I had no idea that the subject would excite the interest that it has already excited, and I congratulate those who have pushed the matter in such practical directions. I believe and hope that you will have a continued success in your experiments that you are about to make.

W. J. TURNER, M.D., D.D.S.,
Editor New York Odontological Society.

FIRST DISTRICT DENTAL SOCIETY, STATE OF NEW YORK.

THE First District Dental Society of the State of New York held a regular monthly meeting Tuesday evening, December 13, 1898, at the New York Academy of Medicine, No. 17 West Forty-third street; the president, Dr. A. R. Starr, in the chair.

After the transaction of routine business the president introduced Professor FANEUIL D. WEISSE, who read the paper of the evening, entitled "Open Maxillary Sinus with Concomitant Maxillary Sinusitis."*

Discussion.

Prof. DWIGHT L. HUBBARD. I thank you for the privilege of having a word to say. This is a subject in which I have been very much interested for several years. I have had considerable to do with this triangular space in the maxillary bone which Professor Weisse correctly calls the "maxillary sinus."

Professor Weisse spoke of perforation of the roots of the teeth into the maxillary sinus not being necessary for the production of empyema. I heartily agree with him that very few cases of perforation are seen. I have one specimen in my office; the only one I have ever seen which shows an actual perforation of the floor of the sinus.

Professor Weisse's theory regarding the anatomical phenomena of the osseous floor of the sinus I think is absolutely true. When we consider the condition of the alveolar process which underlies this osseous floor, we find that it is a honeycomb structure, which is very absorbent. In the first place we have a capillary structure in the alveolar process, and in the second place we have a more horizontal condition, which gives rise very readily to absorption.

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*Printed in full at page 538 of the current number.

I want to emphasize the point Professor Weisse made. I think he is entirely correct in his theory, and he is borne out by authors, but I give him the credit of being original in expressing that idea which I am very glad to hear, as it is one on which I have expended some study.

Professor Weisse spoke of the antrum in its relation to voice production. The dental men do not recognize enough of this to satisfy me,—*i.e.*, the opening from the nasal cavity from the antrum by means of the ostium maxillare is an absolute necessity to proper voice production. Suppose that the right side of my nose were closed; it makes a great difference in voice production, the tone becoming nasal at once. Closing the other side, the result is the same; an actual demonstration of the necessity Professor Weisse mentioned.

Our faces and heads are full of these cavities, and I believe that dental men should be very careful of this maxillary sinus.

What the essayist says later on in his paper about the care which should be exercised concerning the cause of pericementitis, not only in the first and second molar but in the cuspid teeth, because of this intimate relation, is very important. The antrum is contiguous to these disturbances, and all these structures in the face are of a porous character.

The superior maxillary bone is of a porous character, and has a greater blood-supply and greater absorptive quality than has the inferior maxilla. It is for this reason that we get so many empyemic troubles.

The vocal resonance is altered absolutely by the presence of the air. There is a lack of communication and consequently of resonance.

At Hartford, a short time ago, I read a paper upon the relations of artificial dentures to the production of the singing voice. I tried to illustrate that there is a lack of communication and of resonance or vibration from the voice through artificial dentures, whether they be plates or gold, amalgam or other fillings, or whether the vulcanized rubber of the upper plate were backed by gold or other metal. I simply theorized on the matter, and left the subject where it was, asking the dental men to "solve the question."

The first effect of inflammation is congestion or hyperemia, and the last stage is the formation of pus in the maxillary sinus and other facial cavities.

I wish to emphasize this point of vocal resonance and the importance of paying more attention to the same. The vocal cords are the initial "starters" of the main tone, and the points above are the evidence of their completion. No proper tone can be produced with vocal cords alone; the larynx and the cords above it are an absolute necessity to such production. Taking a tuning fork of middle "C" pitch, one man's voice may be apparently high or low, the first one having no resonance, and the second one being deep because of resonance; but it may be exactly the same tone.

You are negligent in your duty, it seems to me, with regard to the consideration of the oral cavity; because there is a direct communication with the sinuses of the head, and you are sometimes responsible for troubles arising from this, and still you have an opportunity to benefit humanity by using preventive measures.

Dr. JOHN I. HART. There are only two points in which I would differ from Professor Weisse. He deprecated the use of anything to retain an opening to the maxillary sinus, and yet says that after the flow of pus has ceased he has no fear of allowing the orifice to close. I do not think any of us would at that stage of the case, but I have met with difficulty in the mucous membrane becoming inflamed at the orifice and closing it prior to the time the flow of the purely mucus discharge ceases, and then any attempt at forcing the syringe into the cavity for the purpose of cleansing it adds to the irritation. Where there is a tendency to the premature closing of the orifice, it is an advantage to hold it open for a limited length of time.

Again, the essayist deprecated the use of any operative procedure. That is sometimes necessary where an abscessed tooth has remained so long in position that the alveolus has become necrotic, and the presence of the necrotic alveolus is a considerable source of irritation. I think under these circumstances we are justified in burring out the alveolus.

Dr. NELSON T. SHIELDS. Dr. Hart touched upon the very point that I wished to elaborate. In a case of an open maxillary sinus, I invariably keep it open with cotton. I have always used large balls of cotton, and kept the sinus open as long as I desired, until all suppuration ceased, then simply used a smaller piece of cotton, adjusting it exactly to the spot desired, so as not to allow it to enter the nostril, and diminished the size of the cotton day by day until it closed.

Another very important point (although it is perhaps a little digression from the paper) is the way to prevent an open sinus. I was very glad indeed to hear the essayist say that the principal cause arose from abscessed teeth, and abscessed teeth necessarily involve root-filling. Dr. Weisse has placed the cause at our door, where it justly belongs, and scientific root-filling will prevent it. All of us must keenly feel the responsibility of filling any root. Maxillary sinus troubles are caused by imperfect root-filling, and the decomposition from the unfilled portion causes the abscess which breaks into the sinus.

If we would take the pains to teach our patients to have root-canals filled properly, we would do much to avoid the necessity for the paper of this evening.

The science of root-filling is sufficiently important to make us realize a responsibility as great as that which confronts a physician who has the life of a patient at stake in a critical illness. I thank the doctor very much; it is exactly the practice that I have pursued, and I have nothing but praise to give the paper from beginning to end.

A MEMBER. Very often second molars situated under the antrum are abscessed, and continually discharging pus from the outside wall of the alveolus, occasionally involving the antrum; I should like to ask the doctor if we should insist upon our patients having these teeth out when it is impossible for us to heal these conditions.

Professor WEISSE. I should certainly advise that a second molar in such a condition be extracted, in order that the existing maxillary sinusitis may be treated.

I was very much pleased with Professor Hubbard's remarks with reference to the vocal function of the maxillary sinus, amplifying as he did my brief allusion to it.

The remarks of Dr. Hart about allowing or not allowing the abnormal opening to close brought out the difficult point that presents,—what guide is there, in respect to the conditions, as to whether we should allow the opening to close? Pus escaping from the sinus means micro-organisms present; that is, an existing septic condition of the cavity, and while they are present the cloaca should not be allowed to close. While pus is discharging the edges of the cloaca are swollen and red, and if there is an attempt at closure, such closure will be attended by retention of pus and local discomfort at the maxillary sinus. Under these circumstances the opening should be re-established by probing and free discharge restored. When the discharge has become mucus, the edges of the cloaca will be free from swelling, of normal tint, and will present an appearance as though drawn in. An attempt at closure, under these circumstances, will not be attended by discomfort at the maxillary sinus and should not be interfered with.

Dr. HART. What about surgical interference?

Professor WEISSE. I said that one indication was to remove all peripheral sources of irritation. If you have necrotic alveolar wall, the indication is to remove it. However, as I am very conservative, I believe that nature can separate dead bone from the living bone better than we can by any operation; therefore, I advise that the alveolus be maintained in an aseptic condition, and when the necrotic bone has been loosened by nature's processes it will come away of itself, or it may be removed.

Dr. HART. How about keeping it open?

Professor WEISSE. I do not use tents in the cloaca to keep it open, as by so doing the pus is retained in the sinus and increases the septic condition.

Dr. SHIELDS. Would not your cap confine it there for the same length of time?

Professor WEISSE. No, because it comes out into the cap.

Dr. SHIELDS. Suppose the cap filled?

Professor WEISSE. In case that pus more than fills the cap it overflows the same; and, as it is taken out every few hours and is left out at night, there is little danger of undue retention of pus.

A MEMBER. What is the usual duration of an abscess of the maxillary sinus?

Professor WEISSE. I have seen cases where an abnormal opening into a sinus closed in three weeks, and I have seen cases where they had lasted for months and even years.

Dr. Shields's remarks upon the importance of filling the root-canals of teeth contiguous to the maxillary sinus were most forcible. The dental surgeon has it in his power, by proper treatment of the root-canals, to place his patient in a protected condition against alveolar abscess and subsequent open maxillary sinus, etc. Take the first or second upper permanent molar with an orifice through the anterior wall of the alveolus, and with the characteristic cloaca present at the labial surface of the gum. In such a condition there would exist a condition of chronic pericementitis, with a certain amount of concomitant maxillary sinusitis. If the tooth cannot be cleared of dead pulp-tissue, from the pulp-cavity and the root-canals, it should be extracted. Crownless roots of these teeth should never be allowed to remain, as they are a constant menace to the maxillary sinus above them. In every case of alveolar abscess of these teeth, they should be extracted, as early as possible, in order to anticipate the degenerative changes of the osseous walls of the alveolus, which so often lead to an opening into the sinus when the tooth is extracted later.

A very cordial vote of thanks was extended to the essayist for his instructive paper.

B. C. Nash, *Secretary.*

SEVENTH DISTRICT DENTAL SOCIETY, STATE OF NEW YORK.

The Seventh District Dental Society of the State of New York held its thirty-first annual meeting at Rochester, April 25 and 26, 1899; Dr. C. F. Howell, of Rochester, president of the society, in the chair.

The society was called to order at 11 A.M. The roll of the members was called, and the minutes of the last annual and semi-annual meetings read and approved.

Dr. W. A. White, corresponding secretary, being called upon for his annual report, stated that he had addressed letters to eminent dentists in all parts of the United States, asking, "Do you favor the unification of the dental laws in the different states?" He received answers, which he read, from Dr. W. J. Burkhart, president of the National Dental Association; Dr. M. W. Foster, dean of the Baltimore College of Dental Surgery; Dr. S. H. Guilford, dean of Philadelphia Dental College; Dr. Eugene H. Smith, dean of the Dental Department of Harvard University; Dr. Truman W. Brophy, dean of Chicago College of Dental Surgery; Dr. A. M. Wright, Troy, N. Y.; Dr. F. LeGrand Ames, president of the Dental Society of the State of New York; Dr. W. C. Barrett, dean of the Dental Department University of Buffalo; Dr. S. B. Palmer, of Syracuse; Dr. J. G. Templeton, dean of the Pittsburg Dental College; Dr. C. N. Peirce, dean of the Pennsylvania College of Dental Surgery; Dr. Faneuil D. Weisse, dean of the New York College of

Dentistry, and Dr. L. L. Dunbar, dean of the College of Dentistry of the University of California. Dr. E. C. Kirk, dean of the Dental Department of the University of Pennsylvania, by way of reply to the question forwarded to Dr. White a copy of the paper read by him on the subject before the Second District Dental Society in Brooklyn last January.

Most of the replies were simply expressions of the belief in the desirability of a unification of the laws when possible, and of the opinion that one who had the right to practice in one state should be allowed to practice in any part of the United States, or, as one stated it, in the world. Drs. Wright and Ames insist, however, that before they favor the extension of the right to practice to graduates of other states the standard, both for matriculation and for graduation, must be brought up in all states to that now existing in the state of New York.

The answers received from Drs. Dunbar, Barrett, and Palmer, being longer and embodying more fully the reasons for their faith, are given at length.

Dr. Barrett says,—

"BUFFALO, N. Y., April 4, 1899.

"DEAR DR. WHITE:

"Yours of the 31st ult. is at hand. I have but a very limited time in which either to consider it or give it answer. Yet it seems to require but little thought for one who is at all familiar with legislation in the different states. It would appear that there could be no difference as to the desirability of uniform legislation. There are more reasons for this than can be seen at a superficial glance. One that is not at once apparent is because of its influence upon American dentistry and American dentists in Europe. In each country of that grand division there is a responsible head for the whole. Legislation for all classes and interests is possible, that shall be applicable to all. Hence there can be a general law regulating the professions and professional practice. There is a standard that is universal, and professional education must be the same everywhere for regular and legal practice. That standard is known everywhere, and foreigners can have knowledge of it and regulate themselves accordingly. Education is a matter of control by the general government, and can be made the same everywhere.

"In this country it is a matter for domestic regulation by each of the fifty different states and sections of the country.

"The conditions in each of these fifty sections materially differ from those in all the rest. One state has been long settled, it has a thoroughly organized and easy working school system, and as a consequence the general intelligence is high and complete. In that state it is possible to establish a high standard of preliminary requirements for professional training.

"In another state, but recently opened up by settlers, there is nothing of what may with propriety be termed a system of schools. The inhabitants are foreigners mainly, of the peasant class, to whom education in their mother country was a thing unknown. They have not yet risen to a comprehension of the possibilities of mental training for people of their status, and if they had, there are no fit institutions to give them education. They form the majority of the citizens, they are represented in the state legislature by men without education or a desire for it, and the people as a whole would have no appreciation of educated men. Hence the professional representatives in their midst are quacks and shysters, and it is their interest to keep the people in the condition of unintelligence.

"There are states at the South whose population is mainly made up of ignorant negroes and poor whites. They have no more use for education than their forefathers had before them, and *they* were about on a par with their mules in literary proficiency.

"Let it be remembered that each of these states is absolutely autonomous in educational matters, and will spend just as much or as little as it chooses for educational purposes. An educated professional man is away out of their comprehension and sympathy. A law that provides for his preliminary instruction, to their dense ignorance simply means that they will be compelled to pay twenty-five cents instead of ten for the extraction of a tooth, or that the professional visit of the medical man will cost them a dollar instead of half that sum. What think you under such circumstances is the prospect for obtaining uniform legislation, and the same preliminary standard in these various states, in the absence of a general law made by a general government that has power to enforce it when enacted? To my apprehension we should not waste our breath just at present in the attempt to secure uniform legislation in the different states, but may do far better to unite in a universal prayer for the millennium day, when no law of any kind will be needed for the repression of vice, because there shall then be no vice to suppress. Would I then discourage all attempts to attain to a better condition of affairs? By no means. Let us keep up the racket, and we will thereby accomplish something in the illumination of the dark minds of the ignorant, and enable them to see the value of education. When this is accomplished, and when the people are made intelligent, there will be no need for any violent movement to secure uniform laws in educational affairs. They will come of themselves. They will prove a necessity.

"But I hope that no one is sanguine enough to imagine that it is possible, until the laity are properly informed, to secure the proper professional status. Just at the present time I am engaged, on the part of the National Association of Dental Faculties, in carrying on suits against some of the dozen or so of fraudulent dental and medical schools in the state of Illinois. These miserable affairs have been legally incorporated under a general law that permits any man, qualified or unqualified, to take out a charter and commence the conferring of degrees practically unrestrained, and the expense of obtaining the charter is about three dollars. Under that law many such schools have been organized, or instituted, which give no instruction whatever, and which advertise their diplomas in nearly every paper of the land. One of them has eight separate charters, and it openly advertises to confer without attendance thirty-six different degrees, in medicine, law, literature, dentistry, pharmacy, music, and in all the sciences. As dean of the Dental Department of the University of Buffalo, I have had a considerable number of these fake diplomas offered me, and upon their strength scoundrel dentists have demanded admission to our junior or senior classes. Well, they did not get it in any case, nor has this college accepted one such under any conditions whatever, no matter what qualifications they may have presented or to what class they have asked admittance.

"One of the first things to be secured was the repeal of the miserable law under which the fraudulent colleges were incorporated. To this end I have had very much correspondence with the presidents of the Universities of Chicago, Northwestern, and Lake Forest, and a federation of all the reputable colleges of Illinois was formed, and we have been before the legislature with a bill that is nowhere near as stringent as the law of our own state. Would you believe it? The legislators of the southern part of the state, what is popularly called 'Egypt,' because of its intellectual darkness, joining hands with the criminals whose interest it is to continue the present condition, have been too much for us, and have defeated all the bills we have thus far had introduced. What think you is the promise for uniform educational legislation, even in Illinois? And it is a matter for professional comment that the National Association of Dental Examiners, in which I am very glad to say our own excellent State Board has no membership, has so far shown not the slightest disposition to interfere with the fraudulent issue of diplomas, but has reserved all its ammunition to use against the National Association of Dental Faculties, the schools that are doing their best to elevate the status, and to bring about something nearer a universal standard of education. The amount of it is, it is impossible to make men either virtuous or intelligent by legislation. Laws may provide the means for enlightenment, but the horse that may be easily led to the water cannot be made to drink unless he wills. It is for us to see that the opportunities for illumination are provided, and then to coax their employment. But the stream can rise no higher than its source, and in my opinion it is useless to look for educational laws or an educational system that is above the comprehension of the average inhabitant of a state. Intellectual and educational development proceed slowly, and time for their growth must be allowed or it is useless to look for their fruit. The men who organized the Dental Society of the State of New York were wise in their day and generation, because they went slow and took no second step until the solid rock of public approval was felt beneath the foot already planted. We have been more than thirty years in attaining our present status, and that in perhaps the most intelligent part of our country. Let us not look to reach the same point of advancement in the dark 'Egypt' of Illinois, or Mississippi, or Arkansas in a month, or a single year. We will, however, keep stirring the fire, and perhaps after a while the pot will boil. When it does we will skim it to some effect, and we will keep up the ebullition until there is a possibility of crystallization into a homogeneous whole, and the organization in every state of a profession that shall represent something more than the status in another locality.

"I set out to write you an apology for not writing, but the subject is one that so absorbs all there is in me of energy and true professional feeling that I have been urged on by the impetuosity of my indignation at the supineness of many of my professional brethren until you see the result. I sincerely hope that you will succeed in awakening the sentiment of dentists to the crying necessities of the hour.

"Most truly yours, W. C. BARRETT."

"SAN FRANCISCO, April 10, 1899.

"DR. W. A. WHITE, Phelps, New York.

"*My dear Doctor*,—Replying to your favor of March 31, I beg to say that I am in favor of unification of the state laws governing dental practice in the United States The reasons for uniform dental laws throughout the country, and indeed the adoption of a national law, seem so obviously necessary from my standpoint as to require almost no argument.

"In the first place, the supervision of dental colleges in the requirement of a fixed educational standard is certainly the business of boards having a legal status. I believe it to be a generally conceded fact that the moral force exercised by any other body created for this purpose exists in name only, and as a force *per se* is of little effect; the enactment of a similar law in every state would readily bring this condition of affairs about. To accomplish the best results I should favor smaller Boards of Examiners, five to be the maximum and three the minimum; that these be appointed by the Executive from a list of ten or twenty names submitted to him annually by the State Dental Society, the individuals so appointed to hold office for four years. That each State Board, without reference to local professional prejudices, be required to send one delegate annually to some central place of meeting, there to meet with like delegates from other states as a National Board of Dental Examiners, and to act conjointly in the matter of determining the status of schools of dental training and the classification of these for the purpose of recognition of diplomas of those conducted up to the prescribed standard.

"The holder of a diploma from a school so listed to be permitted registration in any state without further examination, upon filing the requisite affidavit of being the rightful holder of such diploma; certificate of registration in one state, together with the diploma or certificate of graduation and the prescribed affidavit being all that is necessary for registration in any other state. That non-graduates who may be licensed by reason of practice prior to the passage of such dental law shall only be considered legal practitioners in the state granting such license. In other words, the general effect of registration under an approved diploma does not apply to non-graduates who may be registered as above.

"The unification of dental laws would also do away with irregular entrance to the profession, so that in time examinations by such a board would be restricted entirely to those non-graduates who desired to change their location. As now constituted, the various boards differ in each state both in number and policy, the personnel of some being open to very serious objection and their attitude toward dental education one of hostility; this is probably due to the fact that most boards are appointed by the Executive from the profession at large. Unfortunately, the objectionable practitioner is usually a better politician than his ethical frater, and so does not hesitate to seek such a position in order to hoodwink the laity in regard to his prominence as a practitioner. There should be a combined action by the various state associations in agreement upon a form for a proposed law that would permit of its adoption in each state without alteration in any particular, and the recommending power delegated to the state society as the most representative body. The law should unmistakably define the powers, and if possible the policy, of its board so as to leave no room for quibbling; especial stress should be laid upon the delegate feature in the creation of a national body. I can see only good to result from such action both to the colleges and the profession.

"The Faculties Association has done a good work for the schools, but has reached the limit of its possibilities, and unless some other force more than a moral one is employed the standard will go down below anything we have known. Personally, I am satisfied that the unification of state dental law will do more than anything else to accomplish what is required for the profession. There need be no concessions to the ill-prepared and no short roads to practice provided for any one, even though the individual be a graduate in medicine. The rules of the National Association of Faculties provide for the proper status of medical graduates in the scheme of dental education, which in my opinion require no amendment. It is in the ability to enforce uniformity in college requirements that the association fails, and so jealous are they of their rights with reference to the conduct of their various schools that no other force is recognized or will be until their own insufficiency is made clear to them by actual demonstration.

"There is much more that might be said upon this question, but the collateral issues brought into the question are so far-reaching as to necessitate the full scope of a paper almost, to do the matter justice. Those who have been engaged in dental education for any length of time know the subterfuges employed to dodge college restrictions by the unworthy, and, strange to say, if they fail of success in one school, they readily find another (and a member of the N. A. D. F. also) in which the required concessions can be obtained and no questions of an embarrassing nature asked. When men prominent in associational circles and of high standing professionally are engaged in such work, it is time to make an effort in behalf of a national dental law and a uniform state law that will require all colleges to come up to one standard, and maintain it, or cease operations.

"With best wishes for the success of your meeting, I am

"Yours very truly,

"L. L. DUNBAR, *Dean.*"

"SYRACUSE, N. Y., April 7, 1899.

"DEAR DR. WHITE:

"For more than a score of years I have done service on a Dental Examining Board, which more or less contrasted the difference between state requirements to practice dentistry, which introduces 'state rights.' You ask me if I am in favor of a unification of the dental law. If so, why? If not, why? In addition to the experience above mentioned, I had the opportunity of attending the Second District Meeting, in Brooklyn, January last, and listening to an able paper upon this subject, read by Dr. Kirk, of Philadelphia, which was freely discussed from two standpoints. I cannot say that my previous opinions were changed, still knowledge was gained, and I will briefly give my own views.

"First let us divide the question. I am heartily in favor, and believe it will in time be brought about for reasons that come to our notice as object lessons every month and year. In a military way civilization is shot into the more ignorant, which is now being done at the Philippines. Education is introduced by the slow process of missionary work; various states have laws and standards adapted to the demands of the people. It is stated that New York and Pennsylvania as states having colleges stand the highest in dental laws and requirements. New Jersey, had it a college, probably would be included. It is well known what it has cost those states to advance to such a standard. To hastily bring about unification, the higher requirements would necessarily have to be lowered, for without protection by requirements from other states equal to the higher, education could not be enforced or maintained; that is, a standard of matriculation is the foundation upon which dental education should rest, which in New York and Pennsylvania is about equal to a high school course.

"As long as dentistry is based upon a lower plane of qualification than medicine, as indeed it might be, many of the states are not prepared to adopt a high standard. It would lessen the number of matriculates, and thus injure the colleges. On the other hand, to admit the graduates from colleges of a lower standard to go into New York, Pennsylvania, or other states holding as high requirements without an examination, will undo the progressive work being done at present. We see its workings even in New York. Students who cannot pass the preliminary requirements here are going to other states for an education and a diploma. Such cannot return and register without passing the Regents' requirements, which is that their diploma must give satisfactory evidence that their preliminary education was equal to the state requirements. Thus there seems to be a barrier in the way at present. I am in hope that the National Association of Dental Examiners, or some other national agency, may be able to fix upon a standard which will allow any dentist who holds a diploma from any recognized dental college to be allowed to register in any state in the Union, without examination.

"My present views are that a standard be agreed upon, as liberal as could be indorsed by a number of states, and allow the principle to take effect at once, and as fast as other states would adopt the same requirement they, too, could enter in. This would draw a line and make it an inducement for all to come to a given standard. Even more than this could be done. Let all who hold diplomas from any accepted college, who had or could attain the same standard of preliminary education as would be required by the association, be admitted without examination. This would serve all states alike, and tend to stimulate individual progress even in states not ready to join the association. By this concession those worthy to practice could receive the benefit. Also require that all colleges in the association adopt the standard of preliminary education and matriculate none who fail to meet the requirements. That would bring about a reformation in three or four years from the passage of such requirements.

"I have written in haste, and have no time to rewrite.

"Sincerely yours, S. B. PALMER."

On motion, Dr. White's report was received with thanks for his work.

The reports of the treasurer and the following committees were received and accepted: Committees on Ethics, Finance, and Revision of By-Laws.

The president read his annual address, treating upon society work in general and the work of the district societies of New York in particular, after which adjournment was had till afternoon.

Afternoon Session.

The society was called to order at 3 P.M., and the following paper was read by F. W. PROSEUS, D.D.S., Rochester, N. Y.:

AMALGAM.

Amalgam as a filling-material in dentistry is of great value to the profession, and especially so to many patients. I will not enter into a discussion of its properties, good or bad, either under careless or painstaking hands; neither do I claim it to be superior to or equal to all other filling-materials. The object of this paper will be to give amalgam its rightful place.

I wish to refer briefly to those members of our profession and also the homeopathic branch of medical men who disapprove, condemn, and unwisely discourage the use of amalgam as a filling-material.

To members of the dental profession who condemn its use from the fact of its causing facial neuralgia, odontalgia, etc., I would suggest that the fault lies, in nearly all cases, with the dentist, not with the amalgam.

I do not deny the assertion that mercury, in or from an amalgam filling, will produce a chronic pharyngitis, and perhaps other pathological conditions in persons having an idiosyncrasy to the drug. Still, many staple articles of food are exceedingly poisonous to some people, and it would be as foolish to advise the universal destruction of all such foods as it is to take the ground of the homeopath in regard to amalgam fillings. It's too much like the good, old simple mother that lost her boy at sea in a shipwreck. She condemned all ships sailing after this misfortune, and in her sorrow her ideas were too narrow to grasp the true principle, which is the greatest good to the greatest number.

I believe it the duty of our profession to challenge the proof of the homeopathic idea of such radical lines in regard to amalgam. Should these gentlemen prove to be correct in the position they have taken, it is important that the dental profession should know the true facts; while on the other hand, if, as most of us believe, the percentage of unfavorable cases is so small as not to justify the radical ground taken by the homeopaths, we must disprove the assertions by facts gleaned from our clinical and private cases.

The filling of simple cavities with amalgam need not be mentioned here. Certain and difficult cases only will be considered.

Take those single cavities on approximal surfaces of bicuspids, where either one or both teeth are affected, and we find the whole surface of one or both entirely gone and the teeth crowding, as in Fig. 1, A and B.

It has been my experience to find that most dentists either fill these cavities with cement or adjust to them a gold crown. As for the cement, it soon becomes washed out and produces recesses for food and secretions, and at the best it is only a matter of repeating the same operation, and each time at the great expense of the tooth-structure, besides leaving a flat approximal surface which cannot be self-cleansing, and from which the gum is forced away from the gingivo-approximal margin, while eventually a crown must be resorted to. My method of producing these fillings is first to separate the two surfaces, as in Fig. 2, A and B. In preparing the palatal and labial wall bevel the surfaces slightly, as in Fig. 2, B, as the enamel will stand better here than a thin feather-edge of amalgam. In the majority of cases the fissure should be cut out as in gold fillings, Fig. 2, B, to serve as anchorage, thus avoiding the sacrifice of so much structure at the palatal and labial portions of dentin and enamel. Rubber-dam should be adjusted, and also a carefully fitting matrix selected. I prefer for these cases one made of sheet steel or German silver, and properly contoured with the pliers or ball burnisher. In most cases I find it possible to retain the matrix without tying or wiring.

After sterilizing and drying the cavity, it should be well lined with a balsam or gum lining. Should the pulp be exposed, or nearly so, it should be carefully capped, my method in the latter case being to simply well varnish the cavity and lay a small, thin pad of blotting paper in the yet unhardened varnish; this is now dried, and a small concave cap of German silver filled with cement is pressed lightly to place.

Should the pulp be exposed and healthy the cavity is washed several times with warm water, and sterilized with some antiseptic solution. It is then thoroughly dried with warm air, then flooded with oil of cloves, and heat applied as warm as the patient will allow. After drying the cavity again, several coats of chlor-balsam are applied. Should there be an exudation from the surface of the exposed pulp, the slightest amount of carbolic acid in the cotton with which varnish is being applied will suffice to prevent this. A small piece of blotting paper is cut to suit the case, upon which a small quantity of the pure Canada balsam is placed. This is laid lightly over the exposed portion, the balsam coming in contact with the pulp and surrounding dentin.

FIG. 1.

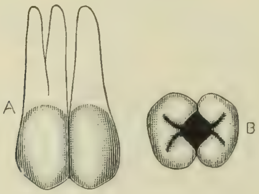
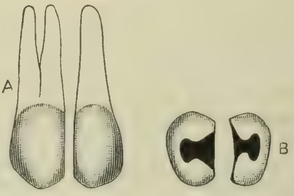


FIG. 2.



A piece of sheet German silver is next fitted to the cavity, concave surface filled with cement (I prefer Harvard for this work, as it is very sticky), and pressed to place. After allowing to harden, we are ready for the final filling. In these cases the filling of both cavities must not be done at the same time. A small quantity of amalgam is now mixed and simply squeezed between the fingers, leaving it in a thin mass. Harvard cement is now mixed and cavity lined, the greater portion being placed in the central part of the cavity. Should the labial wall be exceedingly thin and transparent, line this well with cement. Lay in carefully a piece of the ready amalgam and press the cement to place, working the amalgam into the retaining portions carefully, but avoid displacing all cement. Allow to harden; then take chisels and thoroughly dress all walls and margins wherever cement has come in contact with them. Now adjust the matrix, mix fresh amalgam, work rapidly, and finish filling with amalgam so dry that no mercury appears under the instrument. Dismiss patient with matrix in place, and finish at future sitting, using strips, disks, and pumice, as in finishing gold.

These fillings, when finished, should knuckle at the approximal surfaces. The gum will return at the approximal cervical margin, and the space will be self-cleansing.

Large occluso-approximal cavities in molars are filled with good success with amalgam lined with cement, using a post for support oftentimes where the pulp is devitalized. In these cases I find it frequently necessary to fasten the matrix. The matrix is made as in Fig. 3; contoured at the cervical part. Holes punched for wire, and bound in place with ordinary binding wire. After twisting the wire taut, the free end is brought around and left at the most convenient interdental space until the next visit of the patient. The larger the body of cement used in these cases the better, as you get sufficient strength if the edges are properly done; and the less body of amalgam the less shrinkage. Let Fig. 4 represent the case, with cement in place. Large distal cavities in superior cuspids (Fig. 5) lined with cement and filled with amalgam often make splendid restorations, the labial surface of the amalgam easily being cut out and filled with gold, making a piece of work far superior to a crown in every way, besides being within the means of many of our patients.

FIG. 3.

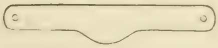


FIG. 4.

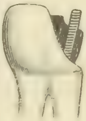
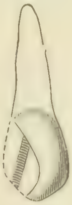


FIG. 5.



Kindly understand me, I refer only to that class of cavities so large that the price of good gold filling is out of the question, and where cement would be simply an excuse for doing anything with such a tooth. Also in the bicuspids this can be done, but they should be well separated, so the gold can be brought well between the teeth and finished. Where we have a chalky white, suspicious-looking tooth, which after the cavity is prepared looks unsatisfactory, and you wish to use amalgam, but hesitate for fear the cavity edges will soon break down, I find it good practice to dry this class thoroughly and paint edges of enamel and dentin with nitrate of silver before filling.

In cases where it is impossible to apply rubber-dam, or keep cavity thoroughly dry for any length of time, or where there is bleeding or exudation of serum at gum-margin, as often occurs in buccal cavities, dry the cavity and quickly work a piece of rather soft amalgam into it. Be sure to cover edges and side ahead of the moisture, then continue filling with well-squeezed amalgam; freely wash it with water as it progresses, bearing in mind that water does little harm to the material, but blood, serum, and saliva are of great injury to amalgam fillings, as well as soft gold.

In using amalgam in deciduous teeth I believe it important to line all deep cavities with cement if possible.

Discussion.

Dr. F. J. Woodworth, Rochester, said the subject of amalgam in deciduous teeth was hardly mentioned in the paper, but perhaps received as much attention as it deserved; but, treating upon the manipulation of amalgam and the restoration of teeth by means of amalgam, the paper is of great interest and value, as it points out the little, but important, essentials which are apt to be overlooked because amalgam can be so easily placed in a tooth-cavity. The neglect of these points accounts for many failures in amalgam fillings. He was anxious to test the essayist's method of capping pulps by the use of a thicker layer of Canada balsam than is usually used, as it seems to promise better results than the methods he had used with indifferent success and little confidence. He hoped that this method would prove more successful.

In regard to treatment of deciduous teeth, he had found in cases where the timidity or nervousness of the little patient or the excessive sensitiveness of the tooth prevented the proper preparation of the cavity a solution of alcohol, resin, and silver nitrate would prove of great value. After drying out the cavity, flooding it with carbolic acid or oil of cloves, he places this solution on a pellet of asbestos felt over the soft decay and fills over this with cement, or preferably, if the cavity will retain it, with gutta-percha. If you have occasion to examine a cavity that has been filled in this manner afterward, the surface will be found to be hard and black, with no sensitiveness to thermal changes, and lasting in its preserving properties. It commends itself because it reduces the painfulness of the preparation and filling to the minimum, while the results are all that could be desired.

Dr. Proseus said that amalgam was, of all filling-materials, the most abused and more carelessly used than any other, and it consequently was undervalued. One reason, of course, was that people had learned to expect a uniform price for amalgam filling,—in Rochester usually one dollar,—and if the proper preparation of a cavity took so much skill and time as to justify a charge of three dollars the patient would feel that he had been imposed on and would resent it. In reality an amalgam filling deserved the same care in preparation of the cavity as a gold filling, and the conscientious dentist would not be satisfied with less; and the price should be based upon the care, skill, and time used rather than the material.

(To be continued.)

AMERICAN DENTAL SOCIETY OF EUROPE.

(Continued from page 397.)

After the transaction of routine business, Dr. W. Mitchell, of London, read a paper entitled "The Extraction of the First Permanent Molars," which is printed in full at page 524 of the current issue.

Discussion.

Dr. I. B. Davenport. Dr. Mitchell has expressed the wish that I should reply to his paper. I have not been able to examine the models shown by Dr. Mitchell, but I presume that in the special cases he has treated we shall have no difference of opinion. That I cannot state until I have examined them, because there are questions which arise in matters of articulation, questions of imperfection as a result of extraction, which can only be known by studying models, not only in one position, but in several positions. I have taken models, for instance, of mouths after extraction which seemed to be perfect. But you want to be able to take impressions not only shortly after extraction, but years afterward, in order to say whether the operation has been successful or not. By taking impressions of different positions of the mouth, and all the different positions the teeth can occupy, you will find an amount of variation which is astonishing to any one who has never done so. By making simple examinations, and allowing for changes which have been brought about, the result may seem very perfect, when you examine simply any mouth without regarding the articulation as a whole. I have never objected to the extraction of the molars when the teeth could not be saved, and they were past saving, but apart from this I have failed to discover that Dr. Mitchell's paper throws any new light in favor of the extraction of these teeth; that being so, I hardly think it necessary for me to continue this discussion. That seems to be to settle the question of methodical extraction. In cases in which it is impossible to save the first molars extraction is evidently indicated, but the result I consider only an evil.

Dr. L. A. O'Brian. I had the good fortune a number of years ago to be associated with Dr. Davenport, and I had the opportunity of seeing perhaps the largest collection of models and the result of the most complete investigations that have ever been made on this subject, and I can only say that I found that the result, perfect as it may look at the time, can be better judged five, six, or seven years afterward, or even fifteen years afterward. I have seen mouths which have gone along five or six years apparently greatly benefited, and then I have seen changes take place in the mouth which have been most astonishing, and these changes have been caused, to my mind, by the extraction of the first molars. Of course, I quite agree with Dr. Mitchell and Dr. Davenport that if a molar is so bad that it cannot be saved there is only one thing for us to do, either it will depart or we have to extract it. But it has to be pretty bad before it cannot be saved.

Dr. N. S. Jenkins. I should like to point out one very important fact in the treatment which has been suggested by Dr. Mitchell. It often happens that this decision is arrived at before one can have any knowledge of how large the second molars are destined to become. One of the most melancholy cases I have ever seen is where a dentist had extracted some very large first molars in a mouth which seemed to threaten some contraction. The first molars could have been saved, I am convinced, but they were considerably diseased and broken down. The second molars which followed were so extremely small that that unhappy patient has never been able to masticate properly. That is one consideration which one must have before one in deciding on such an important and radical operation as the extraction of the first molars.

Dr. Mitchell. Dr. Davenport and I seem to be pretty well agreed with regard to the retention of the first permanent molars where possible, but where impossible,—do I understand Dr. Davenport rightly, that the best thing is to remove them? Where the first permanent molars are so bad, then, of course, they would have to be extracted.

Dr. Davenport. Certainly, if you cannot do anything else.

Dr. Mitchell. That makes a very conclusive operation of it. But in regard to the antagonistic tooth, we all know that that changes position, and my contention with regard to this operation is this: that we are not performing a theoretical operation at all. And our articulations, while we can all criticise them from a theoretical standpoint, from a practical one we know which is the best, a comfortable one which you can masticate with, or an uncomfortable one. And I may ask here in parenthesis, how many of our present members masticate properly? I do not believe there is one in ten who does, so that rather spoils the theoretical side of it. If we have a practical available condition of affairs conducive to satisfactory mastication, it does not make any difference if we only have half a set of teeth; if we can *use* that half set, that is the best position to be in,—because we have less to take care of. I am considering this operation more from a practical side than the theoretical one. Theoretically, I am wrong; practically, the results are right. Now with regard to Dr. O'Brian. He speaks about the advisability of saving the old permanent molars where it can be done. I most heartily agree with him in regard to that. And I have a lot of cases, as we all have, where we say, of course we can save them. And what does it mean? We try to save the teeth, we try to make them comfortable, we try to do our level best, and what is the outcome of it? They are a source of revenue to us, and that is about as much as we can honestly say about them. They are not always the element of comfort they should be to the patient, and where they are so badly broken down before the second permanent molar puts in an appearance, and we see they are going to jeopardize the mouth, gentlemen, we are better off without them,—at least my patients tell me so. Of course, we do not always get the opportunity to perform the operation at just the right time, but where there is the ghost of a chance of getting rid of these teeth where they are bad you won't find an ungracious patient a few years afterward. In regard to the change which takes place, I know that Dr. Davenport has one of the finest collections of models extant. We know the arrangement of the teeth changes. We change ourselves, and our articulation changes with us. We cannot always keep them in what we would consider the most available condition. If we can keep the rest of the teeth, bar these that are bad, in a good available condition, I think we have done the best thing for ourselves and for our patients, irrespective of losing a little on the theoretical side in regard to articulation. In regard to what Dr. Jenkins has said about the frequently large size of the first permanent molars, and the possible diminution in the size of the second, I can quite appreciate the difficulty of the situation. But, as a rule, unfortunately, in connection with our present state of civilization, we have a so-called wisdom tooth, a third permanent molar crowding itself where there is no room for it. Nature has not provided for it, and just in proportion to the mental ascendancy of a patient, just in proportion I have found a contraction of the jaws, smallness of the arch, and less room for the third permanent molar. Well, with the first permanent molar out of the way, we give the third a much better chance, and there is no reason at all why the third permanent molar should have the strictures heaped upon it that it has with regard to its being a bad tooth; it has developed at a later period, a better one, and in my opinion it is no worse than the other teeth; but it is worse treated. It is where it cannot be kept clean, but if it comes forward and occupies the space which should be occupied by the second molar we shall still have a masticating surface. It is not on special cases that we can always rely, but it is upon the general average. When we look over the mouths of our patients and see how little we have succeeded in the saving of this troublesome tooth, it is quite worth our considering whether we cannot help them a little better at this period of development.

Dr. DABOLL. In this matter it is difficult to say why this first molar cannot be saved. I do not know why every one cannot be saved if caries has not reached the pulp. It can all be done with the crown. Instead of trying to fill those teeth when they are extensively decayed, I use a crown and save them, and it goes without saying that the natural law would indicate the saving of every tooth. The moment the child loses a first molar it has lost something that can never be restored. Of course there are conditions where one would have to resort to extraction, and if we have to resort to extraction then it is better to produce the best harmony in the articulation subsequently by extracting the four. If I have to extract the lower then, if I can get the patient at the right age, I extract the upper. But it is very rarely that I am obliged to extract a molar for a child like that. I never do if the conditions are such that I can do without it.

Dr. RATHBUN. I want to say a word on one point. By not extracting the first molar do we not, in a great many cases, relegate the second molar to a place where we cannot keep it clean? And it then does not perform its fair share in the function of mastication. The third molar is of a worse texture and lasts a shorter time than the other teeth. By the extraction of the first molar the third molar is brought into that place in the mouth where it is used and can be kept clean.

Dr. L. A. O'Brian. The anatomical position of the third molar is such that this tooth erupts with a very inferiorly developed root. As we all know, in the lower jaw there is a line where the curved root occupies its natural position harmoniously to the curvature of the jaw with firm hold, but if the first molar has been extracted it comes into a very different position in the jaw, and I do not know why it is not possible to keep that tooth clean if people cleanse their teeth properly. But I do not think a third molar is weakened by being brought into a position in the jaw where the bony support is much inferior than when in its normal position. I consider the third molar is not as firmly planted, and is not able to do the efficient work it would have done had it been retained in its original position.

Dr. W. S. Davenport. There is one suggestion I should like to make. It seems to me Dr. Mitchell has made the greatest mistake possible. Not only do we lose the articulation, but in this case, as shown by the model, we lose all action of the jaws, the one with the other. And in this case, what is shown on a larger scale here [illustrating on blackboard], he has created an articulation which causes a shortening of the bite, and it will continue to do so and get worse. Now that is what happened in my own mouth, and I have experience. I know the action of the teeth after extraction; I have studied the question of those different conditions very carefully. You have developed a condition, and it is going to get worse. In the articulation here the lower teeth come up under the front teeth against the gum, creating a formed action in the upper teeth; we must admit that. At the same time you have ruined your brace power at the back, absolutely ruined it simply by the condition of the relations; that is, the angle the tooth has assumed. The result is the upper tooth no longer strikes at the normal point. But the point is that condition is not going to remain; it will go on; it cannot stop this seemingly, to me, very bad condition; but it cannot even remain there. The lower teeth are obliged to tip forward. The result is you have in this case already a state of affairs that is absolutely ruinous even from the best standpoint. Your molars are here falling inward, your upper molars strike here [indicating], and the result is they fall inward and your arch is made smaller. The point I am getting at is this: Dr. Mitchell extracts the first molars before we get the second molars. That is a point which has caused me a great deal of work in regulating teeth, simply because I have been obliged to regulate a good many cases where the first molars have been extracted before the second molars came, and from that cause the teeth fall backward. I have a great many cases, some have been published, where not only the teeth strike at this point, they lose the power of those inclined planes, and the tendency is for the jaw to jump one side or the other. Sometimes the upper teeth fall in in that position [indicating], sometimes they stand out here; sometimes one falls in and the other out, and if that is the case we have much difficulty in regulating the teeth. How are you going to know, if you extract your first molar before the second molar comes? After having studied articulation, we are pretty sure it is a risky thing. Those second molars will come up with the same original anatomy they were intended to have; the result is, the upper tooth comes down at such an angle that you lose all power, and your mouth is as apt to strike off at one side as it is to come down straight. I do not know, gentlemen, whether I have explained my idea well, but I think it is a most risky thing to take out the first molar. I think you ought to wait until you see the position the second molar is going to take.

Dr. L. A. O'Brian. My experience is that cases of irregularities, where every tooth is in the mouth, may be undertaken and carried through in the shortest possible time with the best results. The difficulties seem almost insurmountable, and sometimes quite impossible, in mouths where the first molar fails. Another thing. As I recollect these models, instead of an interdigitation in the region of the bicuspids, the bite is here one cusp directly on top of another. That condition will go on for a short time, until some of those teeth are driven either one way or the other, but there is no sliding action possible in any way in the bite of the patient which those models represent.

Dr. I. B. Davenport. I should like to make a few remarks with regard to the practical results, the comparatively practical results, of the operation Dr. Mitchell is so anxious to perform. I should like to ask him what proportion of successes he has in all the cases of extraction of first molars that he has studied or seen, and what part of its proportions are successful results as compared with what he would consider the bad results. For my own part, I have not been looking for good results any more than for bad results. I mean I have not been looking for bad results any more than for good results. I have taken pains to select perfect results. I have a few cases which Dr. Bryan has sent me, where comparatively good results have been shown. A few have been published. I have had occasion to criticise those, but apart from that, admitting those to be, we will say, very good results, where mastication can be accomplished, and I admit it can be accomplished, even if not with an ideal motion of the teeth, one upon the other, where the function has not been entirely restored and never can be if once disturbed; but the proportion of good results I have found so very small that they are like a drop in the ocean. If Dr. Mitchell can bring me better results I shall be glad to have them. That is the practical side of the question. In regard to the third molars, I have quite a good number of cases where the extraction of the first molar has been followed by bad results. When we extract the first molars we set in motion certain forces which it is impossible to deal with.

Dr. Field. From results made from observation—I have not practiced extensively, but in cases as a last resort—I have found practical results have been satisfactory so far as the removal of very badly decayed first molars was concerned.

Dr. Mitchell. At what time, doctor?

Dr. Field. Just as they chanced.

Dr. Mitchell. Yes, but what age, I mean?

Dr. Field. At various ages. You remarked from ten, twelve, and fifteen.

Dr. Mitchell. I did not say ten, twelve, and fifteen; I said from ten to twelve.

Dr. Field. Very well; I have taken as old as fifteen. If I understand the drawings on the blackboard, I should judge that Dr. Davenport understands the diagnosis of the first molars, that they were extracted too early, even according to Dr. Mitchell's theory. As regards the practical results, I have seen a number of cases where they have been extracted early and with a very small percentage of good practical results.

Dr. Patton. I should like to indorse what Dr. Mitchell has written, with some slight exceptions, particularly the time of extracting the teeth. I have followed this same practice that Dr. Mitchell has recommended for over twenty-five years. I must say I do not agree with Dr. Field, for I have found the most satisfactory practical results. I agree with Dr. Mitchell in every way that if one or two antagonistic teeth require extracting on one side, then one or two on the other side must be extracted also. The results I have seen where that has not been done have been very poor. But I would on no consideration extract the first molars until the second molars had erupted. I have found that by too early an extraction the occlusion of the second molars is very defective, and cannot be depended on. You are working in the dark, not knowing what the future development may be. I have found that by taking out the first molar after the eruption of the second molar, and without allowing them to erupt well, and allowing them to have a decisive occlusion, they will move forward straight, keeping their position and taking the place of the first molar, making a very perfect arch and giving plenty of room to the third molars, which will erupt much earlier under those circumstances. I would advise the carrying out of Dr. Mitchell's proposition or ideas in this way, because it avoids a great deal of crowding in the mouth, and in that way giving the practical results in the conservation of the teeth. As we are all practically well aware, crowding of teeth in an arch is one of the principal reasons of dental caries. Another point against Dr. Mitchell's idea of the too early idea is that you bring too large and heavy a pressure on the bicuspids before the second molars erupt and come into place. This is very liable to give a deformation to the front part of the mouth. The inclination of the teeth is always forward, and if the pressure comes on both sides of the bicuspids it has a tendency to push the incisors to the front.

Dr. W. Mitchell. I am very pleased to note the amount of discussion this has brought up, and I shall be as brief as I can in replying to some of the points that have been mentioned. A point was criticised by Dr. W. Davenport in regard to that case he was looking at. (See Case 4, Fig. 3.) It was the one that I called special attention to, and the condition of affairs was promoted by the long delay in the extraction of the lower teeth. These are not selected cases, but they were cases as I was able to get them. They are the only ones I have, and you will see them in all their deformities. There is not a man in the room that has a better articulation than that of Case 2. As regards the use of the teeth, we very, very rarely get the proper use of our teeth, even under the most favorable circumstances. I have only seen two cases of what I would consider perfect specimens of articulation. They stand out in bold exception, and I do not forget them. I have only seen two cases, and they were in the lower animals. Dr. O'Brian speaks about transposing the position of the teeth; that is to say, the third molar occupies a position in the jaw that it should not occupy, and consequently it is weakened and made less efficacious by its change of position. That can be met by noting the condition of teeth that we may be called upon to regulate. Many teeth we see that are out of position we do not regulate. Some of those teeth are available teeth; they are teeth that are used and have generally suffered nothing in their integrity or strength. I mean they are not weakened by occupying a wrong position in the jaw, or rather out of the line in the jaw; they may be very irregular. Consequently I take it, from a practical standpoint, the third molar does not suffer by traveling forward. There are two types of third molars: one is a tooth that can be extracted easily, and the other one that can be extracted scarcely at all. I think in traveling forward it will make no difference to the availability of the tooth from the standpoint of mastication. Dr. Daboll spoke of his ability to save the first permanent molar. In speaking of the tooth for extraction, it was not whether the pulp was almost or quite invaded or in a very broken-down condition. In whichever case, I say extract, if the retention of these teeth is likely to jeopardize the other teeth. Dr. Patton has spoken of the retention of the first permanent molar until the second has put in its appearance. I would say my object in extracting before this is to prevent the breaking down of the bicuspids, which are the most difficult teeth we have to save. When we have trouble with bicuspid teeth we have a lot of it, and by saving these imperfect and broken-down first permanent molars we are inviting trouble in their neighbors. As a source of revenue, gentlemen, save the first molars as long as you can; work at them and tinker at them. They will be a source of perennial benefit to you as far as your banking account is concerned. But let us do the best we can for our patients, and we shall be fully repaid by their gratitude. The patients whose models I sent around have thanked me for what I did for them. There is one model where the bicuspids are tipped in (Case 3), but the parents did not care about having the teeth regulated. Those teeth were tipped in, and they were that way before the molars were extracted, consequently that must not be put down to the operation. In regard to the condition of affairs spoken to by Dr. I. B. Davenport about the third molars not coming in, we know they are becoming eradicated. You may erupt from one to four, or you may not erupt any. I only say that this operation is worthy of your earnest consideration.

Dr. BROPHY. I should like to say, with regard to Dr. Mitchell's models and the change made in the process, that it seems to me that we have fallen a little short in attaining the end we seek. The end we seek, in my judgment, is not only to put teeth into a proper position for their preservation, but to secure the best possible facial contour. From what little I have seen of the models, I am satisfied they are right. What would be a proper thing for one would not be a proper thing for another. (Models handed to Dr. Brophy.) This model, as you see, shows a natural prominence of the incisors. Consequently I would presume, not having seen the patient, that the upper lip was prominent. In the other you will see there is not that prominence. Consequently I would presume, not having seen the cast, that the mouth needed a little different treatment, and so I would say in passing that the proper thing I think to do in the management of cases of this character to determine whether it is best to move the first permanent molars or not is to study the features of the patient first. I would presume, looking at the cast, that there was a little tendency to prominence of the chin. If so, then we should employ a means to force out the lower teeth, together with the bone, and thereby improve the general contour of the face. My friend and colleague, Professor Case, of Chicago, with whom some of you are acquainted, has attained great success in the changing of the face, and some of the casts that he has—and he has a room full of them—show the changes that may be made in the features. From what was really a hideous deformity, caused by excessive development of the upper jaw, and a receding chin and occlusion of the lower teeth, and perhaps of the upper back teeth, has been changed to a very nice effect. In cases where the lower jaw protrudes enormously, producing a sort of bull-dog look, by the processes he employs of using internal appliances, and sometimes external, such as clamps and chin pieces, that may be changed. Now, in this cast, there is one point on which I will take exception to the methods suggested by Dr. Mitchell, and that is the removal of the first molar prior to the eruption of the second molar. If that be removed, we have placed all the strength of the muscles of mastication on the anterior teeth to take the pressure, and what is the result? We may have a condition such as this: the teeth extending back and occluding so as to occlude with the soft parts. If you notice that cast you will see that the ends of the teeth are not visible. When these first molars are early removed we find, I think, the tendency of the teeth, the bicuspids not being erupted, to take on part of the pressure, and we get a shortening of the bite, we have the lower teeth too short, and they never erupt to their proper level unless we employ artificial means to obtain that end.

Dr. L. A. O'BRIAN. In that smaller model of the two, you say you judge, without seeing the face of the patient, that the lower lip has a tendency inward. Don't you think, under the existing circumstances there as the mouth is now, the first molar having been removed, that tendency will be aggravated?

Dr. Brophy. I do; the tendency will be for that to drop in.

Dr. W. Mitchell. Theoretically, that may be correct, but practically it has not been so up till now.

(To be continued.)

KANSAS STATE DENTAL ASSOCIATION.

The twenty-eighth annual meeting of the Kansas State Dental Association was held at Topeka, May 2, 3, and 4, 1899. A number of prominent dentists from a distance took part in the proceedings, among them being Dr. W. E. Griswold, of Denver, and Drs. L. P. Haskell and A. H. Peck, of Chicago. Officers were elected for the ensuing year as follows: C. C. Allen, Kansas City, Mo., president; R. Matthews, Wichita, first vice-president; W. A. McCarter, Topeka, second vice-president; J. W. O'Bryon, Lawrence, secretary; S. J. Renz, Leavenworth, treasurer.

The time and place of the next annual meeting was left to the decision of the Executive Committee with the suggestion that a joint meeting with the Missouri society be arranged for and held at Kansas City in 1900.

Edward Bumgardner, *Secretary*,
Lawrence, Kan.

NORTH CAROLINA STATE DENTAL SOCIETY.

The twenty-fifth annual meeting of the North Carolina State Dental Society was held in Raleigh, N. C., May 3-5, inclusive. A resolution was adopted looking to the inauguration of a plan by which the members of the society might visit the different orphanages of the state at stated periods and give their services free of all cost to the children in the institutions, thereby giving the children a great benefit that it would otherwise be impossible for them to have.

The officers elected for the ensuing year were: A. C. Liverman, Scotland Neck, president; E. J. Tucker, Roxboro, first vice-president; W. B. Ramsay, Hickory, second vice-president; J. S. Spurgeon, Hillsboro, secretary; F. S. Harris, Henderson, essayist.

The next meeting will be held in Greensboro, beginning May 9, 1900.

J. S. Spurgeon, *Secretary*.

EASTERN INDIANA DENTAL ASSOCIATION.

At the annual meeting of the Eastern Indiana Dental Association the following officers were elected for the ensuing year: F. M. Sparks, Rushville, president; H. M. Brown, Elwood, vice-president; C. W. Orland, Anderson, secretary and treasurer. The

Executive Committee appointed was Drs. F. H. McClanahan, Rushville; F. R. Henshaw, Middletown; Alex. Jameson, Indianapolis.

The principal feature of the meeting was a two hours' talk on cavity preparation, by Dr. C. N. Johnson, of Chicago.

The next meeting will be held at Rushville, in May, 1900.

C. W. ORLAND, *Secretary.*

FLORIDA STATE DENTAL SOCIETY.

THE annual meeting of the Florida State Dental Society was held at Jacksonville, May 2, 1899. The following officers were elected for the ensuing year: H. R. Estes, Palatka, president; E. M. Sanderson, Jacksonville, and D. D. Beekman, Daytona, vice-presidents; C. H. Frink, Fernandina, secretary; L. F. Frink, Lake City, treasurer. Executive Committee, F. B. Hannah, Umatilla; J. E. Chace, Ocala; R. M. Mason, Sanford; J. D. L. Tench, Gainesville; S. W. Allen, Tampa.

The next annual meeting will be held in Jacksonville, on the first Tuesday in May, 1900.

C. H. FRINK, *Secretary.*

DENTAL SOCIETY OF THE STATE OF NEW YORK.

AT the thirty-first annual meeting of the Dental Society of the State of New York, held in Albany, May 10 and 11, 1899, the following officers were elected for the ensuing year: F. Le Grand Ames, Albany, president; J. I. Hart, New York, vice-president; W. A. White, Phelps, secretary; C. W. Stainton, Buffalo, treasurer; R. Ottolengui, New York, correspondent.

MISSISSIPPI DENTAL ASSOCIATION.

THE annual meeting of the Mississippi Dental Association was held in Jackson, Miss., April 5, 6, and 7, 1899. Following are the officers elected for the ensuing year: W. T. Martin, Yazoo City, president; J. D. Wise, West Point, vice-president; A. B. Kelly, Yazoo City, secretary; J. E. Suber, Crystal Springs, treasurer.

The next meeting will be held in Jackson; time to be announced by the president.

A. B. KELLY, D.D.S., *Secretary,*
Yazoo City, Miss.

SOUTHERN MINNESOTA DENTAL ASSOCIATION.

AT the annual meeting of the Southern Minnesota Dental Association, held in Mankato, April 11, 1899, the following officers were elected for the ensuing year: W. A. Demo, Blue Earth City, president; R. A. Munro, Chatfield, vice-president; A. C. Rosenquist, St. Peter, secretary; M. B. Wood, Mankato, treasurer.

The work of the society for several years has been of a technical post-graduate character, under the direction of specialists in the particular line under consideration. At this meeting the subject was the practical application of the Bonwill law in articulating artificial teeth, under the direction of Dr. George S. Monson, of St. Paul, Minn.

A. C. ROSENQUIST, *Secretary.*

LONDON DENTAL SOCIETY.

THE fourth annual meeting of the London Dental Society was held April 14, 1899. The following were elected officers for the ensuing year: J. N. Wood, president; F. N. Harvey, vice-president; H. E. Silk, secretary-treasurer.

This association of the practicing dentists of London, Ontario, was organized in 1896, with a membership of fifteen. It now has a membership of twenty-two,—every dentist in the city.

The next meeting will be held the first Saturday in November, 1899.

H. E. SILK, *Secretary,*
185½ Dundas st.,
London (Ontario), Canada.

THIRD DISTRICT DENTAL SOCIETY, STATE OF NEW YORK.

FOLLOWING are the officers of the Third District Dental Society, elected at the annual meeting held in Albany April 18, 1899, in conjunction with the Fourth District Society: Drs. James W. Hine, president; C. H. Bird, vice-president; M. J. Barrett, secretary; J. W. Canady, treasurer.

The meeting was well attended and the sessions were interesting.

SIXTH DISTRICT DENTAL SOCIETY, STATE OF NEW YORK.

FOLLOWING are the officers elected at the annual meeting of the Sixth District Dental Society, held at Binghamton: A. S. Barnes, Oneonta, president; M. O. Landon, Delhi, vice-president; E. D. Downs, Owego, treasurer; F. H. McCall, Binghamton, secretary. The meeting was one of interest, and was well attended.

The society was never so prosperous as at present, having a membership of sixty. The next meeting will be held at Delhi, on the first Wednesday and Thursday in October.

ARTHUR S. BARNES, *President.*

CHICAGO DENTAL SOCIETY.

FOLLOWING are the officers of the Chicago Dental Society for 1899-1900, elected at the annual meeting held in the Stewart Building, April 4, 1899: Garrett Newkirk, president; G. W. Cook, first vice-president; B. D. Wikoff, second vice-president; Elgin Mawhinney, secretary; C. S. Bigelow, corresponding secretary; A. B.

Clark, treasurer; C. J. Merriman, librarian; Edmund Noyes, member board of directors; A. W. Harlan, W. V-B. Ames, C. N. Johnson, board of censors.

C. S. BIGELOW, *Cor. Sec.*,
100 State st.

SOUTHERN WISCONSIN DENTAL ASSOCIATION.

AT the annual meeting of the Southern Wisconsin Dental Association, held at Janesville, May 3 and 4, 1899, the following officers were elected for the ensuing year: F. S. Knapp, Platteville, president; Charles Pierce, Janesville, first vice-president; Adolph Gropper, Milwaukee, second vice-president; J. H. Reed, Lancaster, secretary; W. G. Hales, Mineral Point, treasurer.

The next meeting will be held at Janesville, commencing the first Wednesday in May, 1900, and lasting three days.

J. H. REED, *Secretary.*

LAKE ERIE DENTAL ASSOCIATION.

FOLLOWING are the officers of the Lake Erie Dental Association, elected at the annual meeting, held May 5, 1899, at Oil City, Pa.: G. B. Colt, Cambridge Springs, president; Alvah Johnston, Meadville, vice-president; W. E. Van Orsdell, Sharon, secretary; J. H. Heirly, Oil City, treasurer.

A resolution was passed and forwarded to Governor Stone, asking for the appointment of the Dental Examining Board as constituted by Governor Hastings.

The next meeting will be held at Cambridge Springs, on the first Tuesday in May, 1900.

W. E. VAN ORSDELL, *Secretary.*

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DENTAL COLLEGE COMMENCEMENTS.

OHIO MEDICAL UNIVERSITY, DEPARTMENT OF DENTISTRY.

THE seventh annual commencement of the Dental Department of the Ohio Medical University was held April 18, 1899, at the Great Southern Theater, Columbus, O.

The number of matriculates for the session was one hundred and fifty-three.

The degree of D.D.S. was conferred upon the following:

H. S. Barrick.
J. H. Bristor.
J. W. Dixon.
J. A. Douglass.
F. P. Haverfield.
E. W. Iden.
F. G. Jackson.
J. T. Lewis.
G. H. McFarland.
A. O. McLaughlin.
E. L. Murphy.
D. L. Rankin.
G. W. Reighner.
Phillip Rowland.
W. W. Scales.
L. H. Black.
R. B. Cochrane.
C. E. W. Downie.
G. I. Gunckle.
W. B. Horton.
W. E. Jackson.
R. F. Leslie.
H. M. McDonald.
Harry McLaughlin.
V. I. Miller.
W. Chas. Neff.
E. C. Reed.
J. A. Rockey.
J. C. Stover.
H. D. Thomas.

INDIANA DENTAL COLLEGE.

THE annual commencement exercises of the Indiana Dental College were held in English's Opera House, Indianapolis, Ind., on Thursday, April 6, 1899.

The annual address was delivered by John N. Hurty, M.D., Ph.D.

The degree of D.D.S. was conferred on the following graduates by President Burris A. Jenkins, of the University of Indianapolis:

William H. Allen	Kansas.
John D. Altenburg	Indiana.
Frank P. Anderson	Indiana.
Daniel A. Andrews	Indiana.
Frank W. Bell	Indiana.
Roy F. Bennett	Ohio.
Benjamin S. Binford	Indiana.
Alfred Braddock	Indiana.
Ernest R. Burket	Indiana.
W. G. Campbell	Washington.
Perley H. Chadwick	Michigan.
John H. Cheek	Indiana.
Karl Christofferson	Wisconsin.
J. Frank Cofield	Indiana.
Clinton E. Conley	Iowa.
E. M. Conway	Indiana.
James W. Corson	Indiana.
Charles W. Day	Indiana.
Harrison E. Dempsey	Washington.
Charles E. Eads	Indiana.
W. W. Eckelman	Indiana.
Godfrey D. Eggeman	Ohio.
Wm. A. Fishburn	Washington.
Harry A. Fisher	Indiana.
Benton O. Flora	Indiana.
Forrest E. Freeman	Indiana.
Wm. M. Garver	Indiana.
Frank L. Gilman	Kansas.
William H. Green	Indiana.
Harry W. Gregg	Indiana.
Geo. R. Guthrie	Indiana.
Walter D. Haisley	Indiana.
J. W. Hedderich	Indiana.
Geo. A. Hubbard	Indiana.
Christian F. Kuhn	Indiana.
Albert H. Littlefield	Indiana.
Wilfred J. Lawrie	California.
Maurice J. Lucas	Indiana.
Nicholas E. Lutz	Indiana.
Harry E. Lyman	Kansas.
Samuel A. Martin	Indiana.
Jacob F. Moyer	Ohio.
Thomas G. Naughton	Indiana.
Chas. T. Noble	Pennsylvania.
Samuel Ordetx	Cuba.
Wm. V. Owen	Kentucky.
Arthur B. Phillips	Indiana.
Will H. Porter	Illinois.
Cortland R. Price	Ohio.
Elbert C. Repass	Ohio.
Jesse W. Stage	Indiana.
Griffin S. Stephenson	Indiana.
Archibald Stover	Pennsylvania.
Lee R. Talbert	Minnesota.
Earl C. Thompson	Indiana.
Robert S. Thompson	Indiana.
Wm. H. Thompson	Illinois.
Fred W. Turley	Indiana.
Alva H. Unthank	Indiana.
E. F. Van Osdol	Indiana.
L. E. Van Osdol	Indiana.
Frank A. Wildason	Indiana.
L. E. Wineinger	Indiana.

DENTAL COLLEGE OF THE PROVINCE OF QUEBEC.

THE annual convocation of the Dental College of the Province of Quebec, in affiliation with Bishops University, was held in the Synod Hall, Montreal, on April 12, 1899.

There were seven matriculates for the session.

Chancellor R. W. Heneker conferred the degree of D.D.S. on the following graduates: J. A. Butler, J. K. Cleary, F. W. Henry, W. G. McCabe, and F. L. Wilkinson, all of the Province of Quebec.

MIAMI DENTAL COLLEGE.

THE annual commencement exercises of the Miami Dental College were held in the Grand Hotel, Cincinnati, O., on Friday evening, April 21, 1899.

The number of matriculates for the session was nine.

The degree of D.D.S. was conferred on the following graduates by Mr. William Schuhardt, president of the board of trustees: Fred. C. Addison, Wm. A. Cooper, Edwin E. Harcourt, and Frank C. King, all of Ohio.

OHIO COLLEGE OF DENTAL SURGERY.

The fifty-third annual commencement exercises of the Ohio College of Dental Surgery were held at the Odeon, Cincinnati, O., on Wednesday evening, April 12, 1899.

The annual address was delivered by Dr. C. L. Work, and the class address by Alvin A. Ranshaw, D.D.S.

The degree of D.D.S. was conferred on the following graduates by Dr. D. W. Clancey, vice-president of the board of trustees:

William S. Allen	Indiana.
Alpha H. Barber	Ohio.
G. Foster Bell	Pennsylvania.
Ulysses O. Bikler	Kentucky.
Frank H. Bottenus	Ohio.
James M. Bronaugh	Kentucky.
John A. Chappell	California.
Carlton W. Cragg	Ohio.
Vernon B. Crumbaugh	Ohio.
Chas. L. Chamberlin	Illinois.
Miss Ada A. Farr	Michigan.
Geo. T. Fette	Ohio.
James D. Ford	Ohio.
Walter E. Fox	Ohio.
Wm. C. Geiger	Ohio.
Horace M. Gear	Indiana.
James M. Gilbert	Texas.
Wm. G. Hamm	Ohio.
Howard E. Hathaway	Ohio.
N. Graham Higby	Tennessee.
Harry C. Hodges	Kentucky.
Milton C. Hopper	Ohio.
James W. Huffman	Kentucky.
Chas. E. Kelsey	Ohio.
Wm. R. Kemper	Ohio.
Wm. E. Kennedy	Ohio.
Fred. J. Kern	Iowa.
Alvin E. Kerst	Arkansas.
Fred. F. Kolm	Illinois.
John R. Kuhn	Missouri.
James C. Lehman	Indiana.
Chas. E. Martin	Ohio.
Edwin B. McCoy	Indiana.
John W. McGlashan	Ohio.
James E. Meed	West Virginia.
Frank L. Merkle	Ohio.
Claude Michael	Ohio.
Homer L. Myers	Kentucky.
Fred. M. Nixon	Indiana.
H. A. Phelps	Ohio.
Burk Pickett	California.
Alvin A. Ranshaw	Kentucky.
Wm. A. Raymond	Ohio.
Joseph A. Reardon	Kentucky.
T. Lawrence Rock	Louisiana.
Herbert T. Schilder	Ohio.
Fred. J. Schwierking	Ohio.
Francis J. Shea	Canada.
Chester W. Sheridan	Ohio.
Edwin B. Shrieves	Ohio.
Alva F. Simmons	Kentucky.
Miss E. A. Snyder	Ohio.
Chas. G. Steen	Kentucky.
Wm. Taft, Jr.	Ohio.
John A. Tauber	West Virginia.
Roger W. Taylor	Tennessee.
Miss Hedy Tcherniac (M.D.S., Geneva)	Germany.
Kent C. Willis	Ohio.
Samuel C. Wolfe	Indiana.
Fred. L. White	Ohio.
Elmer E. Young	Indiana.

ILLINOIS SCHOOL OF DENTISTRY.

The annual commencement exercises of the Illinois School of Dentistry were held in Steinway Hall, Chicago, Ill., on Wednesday afternoon, April 12, 1899.

The doctorate address was delivered by Charles P. Pruyn, D.D.S., and the valedictory by Dr. H. N. Lancaster.

The number of matriculates for the session was ninety-four.

The degree of D.D.S. was conferred on the following graduates by Frank N. Brown, D.D.S., president of the college:

A. C. Aldrich, M.D.	New York.
Fred C. Allender	Iowa.
Edward B. Barrow	Arkansas.
William L. Bradford	Illinois.
J. A. Brown	Illinois.
Henry Brophy	Illinois.
Herford Browne	Illinois.
Earl H. Carter	Illinois.
Selby F. Condit	Illinois.
Edward W. Dodez	Indiana.
Claude E. Frazier	Illinois.
Harry F. Grantvedt	Illinois.
Nathan J. Hendricks	Illinois.
M. E. Hoag	Iowa.
Owen P. Jesse	Illinois.
Howard N. Lancaster	Illinois.
Jeremiah L. McCarthy	Illinois.
Wm. R. McGarvey	Indiana.
W. A. Rousch	Illinois.
Wm. C. Shallanberger	Illinois.
Harry C. Snyder	Illinois.
Wallace B. Spafford	Illinois.
Leda Mae Tilton	Indiana.
George W. Umbenhaur	Ohio.
Charles H. Wambold	Illinois.
J. B. Zielinski	Illinois.

KEOKUK DENTAL COLLEGE.

The annual commencement exercises of the Keokuk Dental College (Dental Department of Keokuk Medical College) were held in the opera house, Keokuk, Ia., on Monday, March 20, 1899.

The number of matriculates for the session was thirty-five.

The degree of D.D.S. was conferred on the following graduates by George F. Jenkins, A.M., M.D., president of the college: Lloyd S. Lourie and John M. Hobbs, of Iowa, and James H. Walker, of Kansas.

NEW YORK DENTAL SCHOOL.

The seventh annual commencement exercises of the New York Dental School were held in the Academy of Medicine, New York city, on Friday, May 12, 1899.

An address was delivered by Rev. Frank P. Stoddard.

The degree of D.D.S. was conferred on the following graduates:

Otto Ernst.
Frank W. French.
Mary Fishman.
Herman Grüher.
Edgar F. Lewis.
Jacob J. Mintz.
Anna Rosenson.
Jas. R. Sutherland.
Philip Suriani.
Geo. D. Samson.
Maria L. Tantum.
Matilda Sinai.

COLORADO COLLEGE OF DENTAL SURGERY.

The second annual commencement exercises of the Colorado College of Dental Surgery were held at the St. James Hotel, Denver, Col., on Thursday evening, April 28, 1899.

Dr. W. T. Chambers, dean, addressed the graduating class, and an address was delivered by Dr. A. Stewart Lobingier.

The number of matriculates for the session was twenty-seven.

The degree of D.D.S. was conferred on the following graduates by Dr. H. A. Fynn, president of the college: Karl S. Hart, of Michigan; Howard T. Chinn, Emma J. Young, and Harry T. Ingalls, of Colorado.

DENTAL SOCIETY ANNOUNCEMENTS.

AMERICAN MEDICAL ASSOCIATION, SECTION ON STOMATOLOGY.

FOLLOWING is the revised and complete program of the meeting to be held in Columbus, O., June 6 to 9, 1899:

Chairman's address, Dr. G. V. I. Brown, Milwaukee; "The Human Face and Jaws as a Danger Signal of Systemic Defect or Disorder," Dr. J. G. Kiernan, Chicago; "Cocain and Eucain, their Relative Toxinity," Dr. A. H. Peck, Chicago; "Epithelial Structures in the Peridental Membrane," Dr. Frederick Noyes, Chicago; "Infectious Ulcerative Stomatitis," Dr. John S. Marshall, Chicago; "Oral Surgical Operation," with illustrations showing remarkable results, Dr. G. V. I. Brown, Milwaukee; "Some Points on the Etiology, Pathology, and Treatment of Persistent Pyorrhea Alveolaris," Dr. G. T. Carpenter, Chicago; "Interstitial Gingivitis (so-called Pyorrhea Alveolaris)," giving the result of original work, with large photographic illustrations showing the progress of the disease from beginning to the exfoliation of the teeth, Dr. Eugene S. Talbot, Chicago; "Syphilitic Infection from Dental Instruments, with Cases," Dr. W. L. Baum, Chicago; "Professional Education and Ethics," Dr. A. E. Baldwin, Chicago; "Neuralgias due to Progressive Lesions of the Periosteum," Dr. M. H. Fletcher, Cincinnati; "The Treatment and Positive Cure of Pyorrhea Alveolaris in Connection with Restoration of Normal Articulation," Dr. W. G. A. Bonwill, Philadelphia, Pa.; "The Therapeutics of Inflammation," Dr. W. B. Hill, Milwaukee.

Dr. Bonwill will hold a clinic independent of the meetings of the Section on Stomatology to those who wish to meet him.

G. V. I. BROWN, *Chairman.*
EUGENE S. TALBOT, *Secretary.*

NEW JERSEY DENTAL EXAMINING BOARD.

THE summer examinations of the New Jersey Dental Examining Board will commence on Wednesday, July 5, 1899, at No. 88 Broad street, Elizabeth, N. J., at 10 o'clock. All preliminary credentials from applicants must be approved by the Superintendent of Public Instruction and in the hands of the secretary before June 20.

G. CARLETON BROWN,
Secretary N. J. Dental Examining Board.

BLACK HAWK COUNTY DENTAL SOCIETY.

THE Black Hawk County Dental Society will hold its next meeting at Cedar Falls, Ia., July 18, 1899, at which time Dr. Ferris will read a paper on "The Use and Introduction of Rubber in Dentistry," followed by discussion, and Dr. H. D. Haffa will have a paper on "The Introduction and Use of Amalgam in Dentistry," followed by discussion.

EDWARD E. PEEK, *Secretary,*
Waterloo, Ia.

INDIANA STATE BOARD OF DENTAL EXAMINERS.

The Indiana State Board of Dental Examiners will conduct an examination in dentistry in the State House at Indianapolis, commencing Tuesday, June 13, 1899, at 9 o'clock A.M. sharp. The number of the room in which the examination will be held may be learned from the custodian of the building.

Applicants must come prepared for a three or four days' session, at least two of which will be devoted to practical work.

Those interested should address the secretary for further particulars.

M. A. Mason, D.D.S., *Sec'y Board of Examiners,*
Fort Wayne, Ind.

MASSACHUSETTS BOARD OF REGISTRATION IN DENTISTRY.

A meeting of the Massachusetts Board of Registration in Dentistry, for the examination of candidates, will be held in Boston, Monday, June 19, 1899.

Candidates who have applied for examination will report to the secretary at 9.30 A.M., Harvard Dental School Infirmary, North Grove street, and come prepared with rubber-dam, gold, and instruments, to demonstrate their skill in operative dentistry. Any one who wishes may bring his patient. So far as possible patients will be furnished.

The theoretic examination will be written and include Anatomy, Physiology, Histology, Chemistry, Metallurgy, Pathology, Therapeutics, Surgery, Materia Medica, Anesthesia, Operative and Prosthetic Dentistry, and will be held at Civil Service rooms, State House, commencing Tuesday, June 20, at 9 o'clock.

All applications, together with the fee of twenty dollars, must be filed with the secretary of the board on or before June 12, as no application for this meeting will be received after that date.

Candidates who have failed and desire to take this examination must notify the secretary as above.

G. E. Mitchell, D.D.S., *Secretary,*
25 Merrimack st., Haverhill, Mass.

MISSOURI STATE DENTAL ASSOCIATION.

The thirty-fifth annual meeting of the Missouri State Dental Association will be held in Kansas City, Mo., July 11, 12, 13, 14, 1899. An interesting program will be presented. Hotel and railroad rates have been secured. All members of the profession are cordially invited to attend.

B. L. Thorpe, *Cor. Sec.,* St. Louis.

CALIFORNIA STATE DENTAL ASSOCIATION.

The next annual meeting of the California State Dental Association will be held in San Francisco, beginning Tuesday, June 20, 1899, and continuing four days.

W. Z. King, *Secretary,*
Flood Bldg., San Francisco.

NATIONAL DENTAL ASSOCIATION.

THE annual meeting of the National Dental Association will be held in the ball-room of the International Hotel at Niagara Falls, August 1, 2, 3, and 4, 1899.

A railroad rate of one and one-third fare on the certificate plan will be obtained. Also reduced rates on C. and B. and Northern Transportation Steamship Lines. It is suggested that members living at a considerable distance organize parties and thereby be enabled to secure lower rates from railroad companies.

Following is a list of hotels, with rates per day: Cataract House, $3.00 to $4.00; International Hotel, $3.00 to $4.00; Kaltenback Hotel, $3.00; Imperial Hotel, $2.50 to $4.00; Columbia Hotel, $1.50 to $2.00; Temperance House, $1.50 to $2.00; Niagara Falls House, $2.00; Niagara House, $2.00.

Dr. M. O. Cooley, of Niagara Falls, N. Y., will engage rooms and answer any questions regarding local arrangements for the meeting. Definite meeting places for Sections will be announced later.

It is the wish of the officers of the association that members make special efforts to be present at Section meetings, on account of the unusual number of valuable papers which must first be passed upon by the Sections to which they properly belong.

The following is the preliminary program:

N. S. Jenkins, Dresden, "Porcelain Enamel Inlays."

Edward H. Angle, St. Louis, "Orthodontia." Illustrated.

W. A. Price, Cleveland, "The Absolute Efficiency of the Controllers of the Market for Dental Cataphoresis."

L. E. Custer, Dayton, "Dental Electricity."

S. S. Stowell, Pittsfield, "The Practical Side of It."

E. P. Beadles, Danville, "A Bastard Profession."

Truman W. Brophy, Chicago, "Surgical Operations in Early Infancy for Palatal Defects."

E. K. Wedelstaedt, Minneapolis, "Cements."

James Truman, Philadelphia, "The Reflexes of the Three Lower Molars."

B. H. Catching, Atlanta, "Gomphosis."

R. Ottolengui, New York, "Prognathism." "Extraction and Delay *versus* Expansion and Early Attention." Illustrated.

W. V-B. Ames, Chicago, "Some Phases of the Cement Question."

Thomas Fillebrown, Boston, "A Study of Harelip and Cleft Palate." Illustrated.

M. L. Rhein, New York, "Pyorrhea Alveolaris."

H. S. Harvey, Battle Creek, "Constitutional Deterioration the Cause of Dental Caries."

W. C. Barrett, Buffalo, "Oral Affections in Secondary Syphilis."

C. L. Hungerford, Kansas City, "The Physiological Relation of the Adult Tooth-Pulp to the Economy."

Alton Howard Thompson, Topeka, "Etiology of Gnathic Abnormalities."

Robert H. Nones, Philadelphia, "Dies and Counter Dies."

M. H. Cryer, Philadelphia, "Some New Points in the Anatomy of the Face and Jaw."

C. N. Johnson, Chicago, "The Management of Children's Teeth."

Dr. J. Leon Williams, of London, has also promised a paper.

Also, subjects to be announced, by Drs. W. Geo. Beers, Montreal; G. V. Black, Chicago; H. L. Ambler, Cleveland; W. H. Whitslar, Cleveland; Joseph Head, Philadelphia; A. W. Harlan, Chicago; John S. Marshall, Chicago; A. H. Peck, Chicago; H. J. Goslee, Chicago; R. H. Hofheinz, Rochester; F. W. Low, Buffalo; G. V. I. Brown, Milwaukee; T. P. Hinman, Atlanta; H. H. Johnson, Macon; B. Holly Smith, Baltimore; C. Edmund Kells, New Orleans; M. C. Smith, Lynn; L. M. Cowardin, Richmond; L. L. Dunbar, San Francisco; W. Ernest Walker, Pass Christian.

A revised program, with reports from chairmen of Sections, will be issued later. Prominent members of the profession from abroad have been invited to be present.

The names of the gentlemen who have promised to present papers is a sufficient guarantee of the high character of work which will be done at this meeting. The minor details will be carefully looked after and all unnecessary and irrelevant matter eliminated, so that the business of the association may be transacted in a prompt and expeditious manner. It is hoped that the various State societies will send full delegations, and that all members of the association and reputable dentists in this country and Canada who are not members will show their interest in and loyalty to the National Association by attending this meeting.

H. J. BURKHART, *President.*
EMMA EAMES CHASE, *Cor. Secretary.*
J. N. CROUSE, *Chairman Exec. Committee.*

TO AMERICAN DENTISTS PRACTICING IN EUROPE.

AT a special meeting of the Foreign Relations Committee of the National Association of Dental Faculties of America, held in Cincinnati, Ohio, December 27, 28, and 29, 1898, in accordance with the instructions given at the annual meeting of the association, held in Omaha, Neb., August, 1898, certain of their *confrères* living in Europe were appointed to form the nucleus of an advisory body, the membership of which it is their purpose to increase to the number of three for each of the principal countries of Europe, as soon as they shall become thoroughly convinced as to the best manner of organizing such board, and fully informed concerning nominations for membership therein.

The Foreign Relations Committee feels itself restricted in its action by the instructions given it by the National Association, and cannot at present clearly see its way to do more than to lay the foundation for future more comprehensive action. It believes that any precipitancy on its part, in the absence of a full and clear comprehension of the exact status of American dentistry in Europe, might do great injury to the cause of American dental education, and prejudice us greatly in the eyes of foreign professional men. The members also realize that until there is a better understanding of professional affairs in Europe by Americans in this country, it would be easy to injure our colleges by creating a prejudice that would be baseless and unjust. No possible harm can result from the exercise of great care, and even from delay on our part in the completion of the appointment to this board, while radical action in the absence of definite knowledge would be certain to work evil.

Hence the committee has not felt itself justified in doing more at present than to make a few appointments that are entirely unopposed, and to go no further than to commit to such members of the Foreign Board the responsibility of examining the credentials of students making application from foreign countries for matriculation in American dental colleges, the advising of the Foreign Relations Committee of the requirements demanded for practice in such countries, the number, names, and professional status of the holders of American dental degrees abroad, and the giving of such other information as may prove of benefit to the National Association of Dental Faculties. For the information of such Foreign Board the committee has unanimously adopted the following expression of opinion:

First.—The proposed board shall be known as the European Advisory Board of the Foreign Relations Committee of the National Association of Dental Faculties of America.

Second.—Its objects shall be to ascertain the standing and reputation of institutions in foreign countries giving instruction in dental subjects, the character of instruction imparted, the different courses of study, the length of term, the requirements for admission, and the form of certificate given entitling the holder to practice dentistry in such foreign countries.

Third.—To examine the certificates of Europeans who purpose coming to this country to complete their dental studies after a course more or less complete abroad, to report upon the value of such certificates, and how much credit should be allowed them in American dental colleges as a consequence, and to communicate to the chairman of the Foreign Relations Committee any further facts that may serve as a guide to the deans of American dental colleges in the reception and proper assignment of such students.

Fourth.—To furnish the Foreign Relations Committee with the names of such persons as may have come, or who may purpose coming, to the United States for professional instruction, and whom they may believe to be unworthy reception in American colleges, with the facts upon which such belief is based.

Fifth.—To obtain for the Foreign Relations Committee, as far as is practicable, a complete list of all American graduates practicing in Europe, giving names of the schools that issued their diplomas, together with date of graduation, and the general reputation and status of such graduates.

The Foreign Relations Committee desires explicitly to say that while it is not authorized to extend the scope of its present action, and deems it unwise on its part to go further in defining the duties of the European Advisory Board, it is heartily in sympathy with American dental graduates abroad in their efforts to obtain a due recognition of the American dental degree in Europe, and pledges itself, whenever it believes the time is ripe for definite action, to take any steps which in its opinion will tend to bring about so desirable an object.

The committee desires to announce the following appointments to the European Advisory Board: Great Britain, Dr. W. Mitchell, London; Holland and Belgium, Dr. J. E. Grevers, Amsterdam; Denmark, Norway, and Sweden, Dr. Elof Förberg, Stockholm; Italy and Greece, Dr. Albert T. Webb, Rome; France, Dr. J. H. Spaulding, Paris; Switzerland and Turkey, Dr. L. C. Bryan, Basel.

S. H. GUILFORD, H. W. MORGAN,
J. D. PATTERSON, W. C. BARRETT, *Chairman,*
T. W. BROPHY, *Committee.*

ILLEGAL DIPLOMAS.

Much injustice has been done to American dental schools by the circulation of unfounded rumors of irregular graduations from reputable colleges where no facts are given which will sustain them. It should be generally known that the Foreign Relations Committee of the National Association of Dental Faculties in America is ready and anxious to prosecute any college associated with it which in any way breaks its high and stringent published rules or any state laws.

Any complaints sent to Dr. James Truman, 4505 Chester avenue, Philadelphia, U. S. A., will be duly considered by this committee and reported to the association, and any college will be disciplined if found guilty.

I am also prepared to give careful attention to any such cases and report them.

Those illegal institutions which have in former years sold diplomas in Europe have been and are being prosecuted as fast as conclusive proof of such acts are in the hands of the proper authorities.

Dr. W. C. Barrett, of Buffalo, N. Y., has been especially active in hunting down these obscure swindlers, who only advertise their wares in Europe.

The profession in Europe is earnestly requested to assist with any clear evidence it can produce or indicate where it can be found.

L. C. Bryan,
Chairman of the Association of Advisory Boards of the F. R. Com. of N. A. D. Faculties.

Basel, Switzerland, April 10, 1899.

PENNSYLVANIA STATE DENTAL SOCIETY.

The thirty-first annual meeting of the Pennsylvania State Dental Society will be held at the Neversink Mountain Hotel, Reading, Pa., July 11, 12, 13, 1899.

An unusually attractive program has been prepared and will soon be ready for distribution. All members of the profession are cordially invited to attend.

Those desiring to read papers or give clinics will please notify the chairman of the Executive Committee as soon as possible.

This meeting will be one of importance to every practitioner in Pennsylvania, and all who can be present and take part in the transaction of business should not fail to do so.

Edward C. Kirk,
Chairman Executive Committee.

COLORADO STATE DENTAL ASSOCIATION.

The Colorado State Dental Association will meet in Denver June 13, 1899, and remain in session until the 15th. It is hoped that a large number from out of the city will avail themselves of the opportunity and attend, as there will be much of interest to all dentists.

Sarah May Townsend, *Cor. Secy.*,
1425 S. 13th st., Denver.

MAINE BOARD OF DENTAL EXAMINERS.

A MEETING of the Board of Dental Examiners of the State of Maine will be held for the examination of applicants at the Eye and Ear Infirmary, corner of Congress and Vaughan streets, Portland, on Tuesday, June 27, 1899, at 2 o'clock.

Each applicant is required to bring gold and such instruments and appliances as he may require in operating upon the teeth. Those who wish may bring patients, but for those who do not patients can usually be secured.

To secure examination at this meeting the application must be filed and the fee of twenty dollars must be paid to the secretary on or before Saturday, June 24.

D. W. FELLOWS, M.D., *Secretary,*
Y. M. C. A. Building, Portland.

NATIONAL DENTAL ASSOCIATION—SECTION VII.

THE Section of Anatomy, Pathology, and Surgery would be pleased to receive contributions, either papers or exhibits. Respond promptly either to Walter T. Lewis, sec'y., Oakland, Cal., or W. C. Barrett, chairman, Buffalo, N. Y.

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EDITORIAL.

THE NATIONAL STANDARD OF REPUTABILITY.

HENRY WARD BEECHER has been cited as authority for the statement that "Orthodoxy is my doxy; heterodoxy is the other fellow's doxy."

Regardless of its origin the thought contained in the quotation is, broadly speaking, not without applicability to human nature generally, but in a special sense to that phase of human nature which concerns itself with dental educational qualifications. It is quite impossible under existing circumstances that our profession should be fully in harmony concerning the dental educational problem, either as to what shall constitute the educational equipment of the practitioner, or as to how his equipment shall be attained. There are nearly as many views on these two questions as there are individuals in the profession, and existing educational systems and methods are, in a certain sense, the resultants of these antagonistic forces propelling the educational machinery along lines of least resistance.

Incident to this propelling process there is developed the attitude of mind embodied in the quotation which heads this article. One man or class of men impressed by the truth of their view become in a degree blinded, by its apparent all-embracing truthfulness, to the fact that they have not included all the modifying factors in reaching their generalization; hence they are incapable for the time being of estimating its weakness or its limitations. Believing in the philosophy and partaking of the temperament of Mr. Jack Horner, of classic fame, they contemplate the particular plum of truth which by chance they have extracted from the pie of life's circumstances, and, like their illustrious predecessor, are duly impressed, as was he, with the immensity of their own bravery. If it rests at that point no particular harm is done, but should it develop into a belief in their own orthodoxy and the heterodoxy of all who have discovered other plums of truth, much mischief may be the temporary result.

The desire and demand for a higher standard of dental education has brought to the foreground many examples of the professional Jack Horner, who, animated perhaps by the best of motives, have announced their discovery of the ideal and therefore only practical method by which the desired standard was to be achieved.

No exception can be taken to the motive. Every honest student of the question will admit that the salvation of dentistry, morally as well as technically, is to be achieved through higher educational attainment. No amount of argument or specious reasoning can change the plain facts of the case that demonstrate the causal relationship between ignorance on the one hand and empiricism, selfishness, and quackery on the other. These facts are generally conceded.

What is not by any means as clear is the method by which the incubus of low standards of attainment is to be removed from the profession as a whole. It is this problem which is the crux of the whole matter, and concerning which so great diversity of opinion exists. In the language of the Abt Vogler,—

> "Each sufferer says his say, his scheme of the weal and woe,"

yet no prophet has arisen to point out a detailed solution of the difficulty.

We have contended in these pages and still hold to the belief that the general means by which the average of educational attainment in dentistry may be elevated is to be found, and found only, in adequate legislation by the several states of the Union. No general improvement is likely to be achieved until the states as a whole demand a specified standard of qualification upon a plane sufficiently high to eliminate the factors of ignorance and incompetency with which the profession is now contending.

It is true that dental legislation imposes the difficulty of a tedious element of time in reaching the desired end, but it carries with it the compensating feature of an efficient and satisfactory result when attained.

Like all progressive movements, efforts at state control of dental educational standards have met with criticism and opposition, and the reasons therefor are not far to seek.

They arise from two causes: First, from those who deny the right of the state to exercise the control in question, and, second, from legislative enactments based upon faulty conceptions of the right of the state to the exercise of its police power in the creation of standards of dental qualification. The first of these may be dismissed as unimportant, for the reason that in no case has the constitutional right of the state in this connection been successfully combated in the courts, but, on the contrary, the right has been universally sustained. State dental legislation has been faulty in general because it has failed to clearly recognize the fact that its function is first to establish a standard of qualification, and second to provide proper equitable means to determine whether the prescribed standard has in each case been attained by the applicant.

It is not the function of the state to prescribe or control the method or means by which the standard shall be reached; it is the misunderstanding of this vital point which has done more than any other thing to not only create antagonism between those engaged in the training of men to meet the standards prescribed by the states, but it has served to cast suspicion and discredit upon state control of dental educational standards as a legitimate and potent means for professional advancement. Acting upon the mistaken belief that the business of educating practitioners of dentistry was a matter directly within the powers of state control, the National Board of Dental Examiners has been inspired with the laudable motive of legally forcing the process of dental education to a higher plane, but the means by which the end was sought to be attained was and is defective in that it is extra-judicial.

Certain rules and regulations, excellent in themselves, were promulgated by the National Association of Dental Examiners, prescribing the character of preliminary training to be demanded; the length of course to be pursued; the nature and extent of instruction to be given; the character of material equipment of schools; the number of instructors required; the extent of floor space to be occupied; the disposition of medical and dental classes with reference to the instruction severally given to them in certain institutions: these were all assumed to be proper subjects for control by the National body concerning itself with state dental laws. Compliance with specific rulings on these points was made a *sine* *qua non* for obtaining the national stamp of reputability of the Board.

It is true that the word reputability was not the term applied by the National Board, but "recognition" was the quality and distinction conferred upon all schools that signified their willingness to be bound by the prescribed rules. The difference between "recognition" and reputability in this connection is not great; the former clearly implies the latter, and not only has it been so interpreted by the National Board itself, but by the courts. The attempt to create a national standard of reputability on such an insecure basis, one having no conceivable legal warrant, is working out its own destruction by the test of time and application.

Quite recently the State Board of Wisconsin refused to issue a license under the Wisconsin statute to a graduate of the Chicago College of Dental Surgery, alleging as the ground for their action that said college, not having complied with the rulings of the National Association of Examiners, was not on the list of recognized schools. This act of the Wisconsin Board at once raised the question of reputability of the school, and under a writ of mandamus the case was decided against the board, as has been the uniform ruling in analogous cases.

Following are some of the more salient features of the opinion of the court in the case under consideration:

"Now it must be clear that this State Board of Dental Examiners has the powers conferred on it by statute, and nothing more or further. . . . .

"But the Wisconsin State Board of Dental Examiners assumes the right to say to a graduate of that institution, 'You cannot be licensed to practice in Wisconsin unless you get the Chicago College of Dental Surgery to adopt for their course of instruction hereafter certain studies that we want to have incorporated in their curriculum, because if they do not we shall set down their institution as not reputable.' This position of the State Board is defective in two vital particulars. In the first place it assumes that the State Board in and of itself has a right to determine what shall constitute a reputable dental college; and in the next place it assumes that the State Board has a right to say that certain branches of study are essential to reputability as practically applied by the board in Wisconsin. In my judgment neither of these positions can be successfully maintained by the board. ,

"The State Board has no more right to determine what shall constitute reputability than they have to say what shall constitute incorporation. . . .

"The State Board has not an unqualified right to determine what reputability means so that no one can question such determination. If this were true, then there would be no standard for reputability. It would all lie with a board constantly changing in membership, and the board one year might determine that one thing was necessary for reputability, and the next year the same board, or a board differently constituted, might determine that another thing was necessary to reputability. Reputability, as used in the statute, must mean the general repute of the institution. . . . .

"Then, again, it cannot be possible that the State Board of Dental Examiners has a right to insist that in order to constitute a dental college a reputable school it must teach certain branches. Thus it is not necessary that a dental school, in order to be reputable, must teach Latin and the higher mathematics. . . . . They might be proper for high scholastic acquirements, but are by no means necessary to reputability. . . . .

"Furthermore, the power of the board to prescribe what scholarship acquirements are necessary for graduates of dental schools is contained in the statute itself. . . . . It is proper for the board to inquire if this provision has been complied with. But when the board insists upon other scholarship acquirements, it is acting wholly outside of its jurisdiction or authority. . . . .

"So that in the opinion of the court the contention of the State Board must fail, because the board has not the right to fix an arbitrary standard of reputability, and it has no right to insist upon certain additional studies being followed in any dental college, as the basis of establishing reputability, and that the course of the State Board in the premises is arbitrary, unreasonable, and unjust, and such as the courts cannot sustain."

The National Association of Dental Examiners has had the question at issue prominently before it on other occasions.

We quote as follows from the stenographic report of proceedings of the meeting held at Old Point Comfort in 1897:

"The President. The decision of Judge Goggins has worked rather unfortunately.

"Dr. Smyzer. For the information of those who are here, I will say that Dr. Davis told me himself that when they went into court the judge asked them why they rejected the student of a certain college and how they knew it was disreputable; they said because the National Association of Dental Examiners, this body, had advised them to that effect. He told me the judge said, 'What * * * * has the National Association of Dental Examiners got to do with our state laws?' The report of this body in that direction might be good evidence for us, but not for the court, so it seems it is our duty to investigate that for ourselves. It is a very important matter, if we ever get before the courts, and I think every member here ought to take notice of that and be sure, should they ever get into court, to have something else back of them to rely upon besides advice from this board."

There is no lack of clearness in the statement quoted from the learned judge; his position is simply a reflex of well-known legal principles and based upon clearly accepted precedent.

Why, then, in view of these facts and the accessibility of reliable information and counsel on the point at issue, should the National Association of Dental Examiners persist in their efforts to short-circuit the path to higher educational standards by imperfect and illegitimate means? We do not criticize the motive; we applaud the desire which we believe animates their action, but the means employed is hopeless, even ridiculous, in the light of events. The idea of a national standard of reputability is conceived in ignorance of the plain teachings of the law of the land and reduced to nothingness by the test of experience. The National Association of Dental Examiners has a responsibility on its shoulders which it must meet intelligently and effectually, or it will discredit itself in the eyes of the profession that looks to it for relief from a present and increasing difficulty. The duty which confronts the National Board is that of so influencing legislation in the several states that uniformity of standard upon a high plane may become an established fact.

As suggestive toward that end, we would direct the attention of the National Association of Dental Examiners and all others interested in state dental legislation to the dental law of Pennsylvania of 1897, concerning which a distinguished jurist has said, "It is the best of any of the dental laws of the United States, and one which any state might be proud to have upon its statute books."

We would again call attention to what seems to be a somewhat widely accepted and mistaken belief,—viz, that any law passed by a legislature can be enforced. No greater mistake could be made. Unfortunately, our lawmakers are seldom trained and skilled in the intricacies of the law, hence the errors resulting from their lack of knowledge must be corrected by the judiciary. Only until a law has run the gauntlet of a court trial can its equity or constitutionality be said to be determined.

Too much dental legislation is rushed through by legislators to please certain well-meaning but uninformed constituents. The making of dental law is a serious matter, and one which, like matrimony, is not to be undertaken "unadvisedly" or "lightly," but "discreetly, advisedly, soberly," and with full knowledge of the conditions to be met and the available means to that end. It would therefore seem desirable that careful consideration of the problem should be intrusted to a commission of competent men, and the attempt made to formulate a law for general adoption which would form the basis of unification of a high standard of professional attainment and furnish the means for its general enforcement. Such a commission could well be created by the National Association of Dental Examiners, with power to add members for conference from the Faculties Association.

We hope that a movement of this character may be inaugurated, and believe that much good would be the necessary result.

ORIGINAL MATTER.

JUST what constitutes original matter from a dental journalistic point of view seems to be a question of individual understanding, but the most original communication we have yet seen is the apology made in the March issue of the *Pacific Medico-Dental Gazette* for republishing Dr. Jenkins's article from February COSMOS without due credit. As the apology is quite spontaneous and evidently genuine, we hasten to accept it, with the assurance that the *Gazette* is welcome to anything we have on the same terms.

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BIBLIOGRAPHICAL.

THE PRACTICE OF DENTAL MEDICINE. By GEORGE F. EAMES, M.D., D.D.S., Professor of Pathology and Therapeutics in Boston Dental College, etc. Octavo, pp. 250. Containing thirty-eight engravings and three colored plates. The S. S. White Dental Mfg. Co., Philadelphia; Claudius Ash & Sons, Limited, London, 1899. Price, $2.75 net.

The number of works on dentistry in its various phases since the Association of Faculties exerted its influence to increase the number of text-books has been remarkable, and to the writer of the review unexpected. They have not all been of equal value, but, taken as a whole, they are far in advance of any period in the history of dentistry. This should have been expected, for the higher education upon dental and collateral subjects in medicine has been so broadened that it has left the books of a quarter of a century to moulder on library shelves.

This book on dental medicine is the latest of the series upon pathological conditions coming specially under the care of the dental practitioner.

The title, while correct, is somewhat misleading, as it seems to cover subjects other than those directly connected with the pathology of the oral cavity.

The book comprises 250 pages, including index, and is therefore not unduly extended; in fact, the apparent effort to keep it within reasonable limits has been at times carried too far, and led to unnecessary brevity where detail is absolutely essential for a proper understanding of the subject.

The object of the author, as stated in the preface, is to comply with a "still greater need, more and more in evidence as the demand for a higher education for dentists grows stronger and the necessity for a more general knowledge of medicine on their part becomes apparent, is for an explanation of the significance of dental and oral relations to certain pathological conditions. . . . It would seem that the time has come when the dentist should possess formulated rules and methods of practice in the medical treatment of dental cases. . . . This book is an endeavor to accomplish the task thus indicated." This is not very clearly defined, but it seems to show that the author's aim has been to bring dental thought and practice into harmony with that of general medicine. The work, therefore, must be judged by what is considered "medical treatment of dental cases." This rather indifferent use of terms leaves much to be desired as to what the author regards as medical in contradistinction to dental treatment.

The work covers an extended field from Chapter I, on "General Considerations in Pathology," to Chapter XLV, on "The Relations of Adenoid Vegetations to Irregularities of the Teeth and Associate Parts."

Chapter II is devoted to the consideration of the "Inflammatory Process in General," with a sub-chapter on the "Internal Nature of Inflammation." These are satisfactory as an explanation of the various phenomena following irritation, the author describing the diapedesis of the leucocytes from actual observation. He seems to have fallen into an error here that should be corrected in future editions, in stating that the migration of the leucocytes was "first observed by Cohnheim." It goes very much farther back than 1867, when the latter startled the medical world with his re-discovery. Döllinger in 1819, and Müller in 1824, both recognized the fact that the white blood-corpuscles passed through the walls of the vessels, and these were regarded by Kaltenbrunner and Addison as identical with pus-corpuscles. Waller, of England, thirty years before Cohnheim, described this process so clearly that his work forced recognition.

Chapter III, upon "Syncope," is divided up very properly under sub-headings, and this systematic treatment is followed throughout the book. First the author gives the "synonym," then follows the "definition," "etiology," and "treatment."

Chapter V, on "Neuralgia," seems to the reviewer to be altogether too general, with a tendency to lead the mind away from local causes and to intensify the impression that neuroses are comparatively rarely the result of dental lesions. While it is true that certain conditions, described by the author, predispose to neuralgia, it is certainly more true that the painful reflexes have generally their origin in some dental disturbance; but the author states that "in enumerating the different local causes arising within the mouth the impression should be conveyed, not that these alone are responsible for the condition which is under discussion, but that the neuralgic diathesis, which is nearly always present, plus an irritated pulp or dental nerve, are together sufficient to cause neuralgia. In the absence of either of these factors there would be no neuralgic symptom. This point needs emphasis, for the reason that the laity, and many dental practitioners as well, are prone to designate the pain arising from pulpitis or pericementitis in certain stages as that of neuralgia." While this may be correctly stated of an untrained class of dentists, it is inconceivable that any of the present generation, unless morally degenerate, could thus impose an absurd opinion upon patients. While it is evident the author recognizes local causes, for he gives a list of these, he evidently regards the medical view as the correct one, and that a "faulty nervous system" has far more to do with it than any local disturbance, this entering into it more as a secondary factor. This cannot be accepted without many exceptions; in fact, it seems to the reviewer as misleading to the inquiring mind upon an important and very obscure subject.

Chapter VIII, upon "Hemorrhage," is an excellent presentation of this not frequently discussed subject. It is gratifying to find the author objects to "Monsel's Solution" as a styptic, on account of the "injury to the part to which it is applied." It is believed that this agent is gradually falling into disuse for the reason named, and properly so, for it has within it an element of danger in all serious hemorrhages.

The illustrations of "Stomatitis Herpetica" and "Syphilitic Chancre" very properly represent these pathological conditions, and could we have more of them in our works on dental pathology they would do more to instruct than pages of text.

In Chapter XVIII, on "Rheumatism," the following is the author's opinion on the connection this bears to pyorrhea: "For many years the endeavor to trace the connection of these symptoms, as shown in the teeth and gums, with some form of rheumatism has resulted in finding in every marked case of so-called pyorrhea certain symptoms, more or less marked, of a rheumatic diathesis." This is rather a broad statement, in view of the fact that hundreds of cases have been under treatment without a trace of gouty or rheumatic conditions. The author may respond to this by stating, as most of those who advocate this idea do state, that this negative observation is due to ignorance, or, to put it more strongly and perhaps more truly, that not having been through the medical curriculum these observers are incompetent to form an opinion.

This may have been good reasoning forty year ago, but not now. This is perhaps a forced construction of the language used, but the inference is unavoidable. The author in the chapter devoted exclusively to pyorrhea alveolaris discusses the origin of this disease mainly through the observations of others, as he quotes profusely—too profusely—from Burchard, Peirce, and others, and comes to the conclusion "that the disease known as pyorrhea alveolaris is in nearly every case the result of a constitutional diathesis; that the teeth are in these cases victims of the local manifestation. It is, of course, acknowledged that the immediate or direct cause may be readily seen in the irritating foreign body known as tartar, or the deposit of whatever character, but in order to cope successfully with the disease we must look for a cause back of this." Space will not permit an opposing argument to this broad assertion, nor would this be the proper place to meet it. It is therefore quite sufficient to say that facts do not confirm this, as the disease has been treated successfully without seeking systemic conditions. He also regards the "prognosis unfavorable to cure." In the light of experience such a statement is unfortunate and discouraging.

The author quotes Dr. Truman as authority for the use of hydronaphthol as a mouth-wash. This is well as far as it goes, but had he combined the statements in the paragraph as the method proposed and used for years by Dr. Truman it would have been more satisfactory. For his information this may properly be here given: (1) Injection with hydrogen dioxid; (2) treatment with commercial sulfuric acid, twenty-five to fifty per cent. in strength, for a minute or two; neutralization with sodium bicarbonate, followed by a wash of warm water; (3) sulfate of quinin, used to prevent ingress of pathogenic bacteria and to antagonize local emigration of leucocytes; (4) the continued treatment of an antiseptic wash, hydronaphthol preferred. No second treatment with sulfuric acid for the first ten days. With this treatment pyorrhea, with or without systemic complications, *can be cured.*

The author divides pyorrhea into two distinct conditions: first, "pyorrhea alveolaris," and, second, "phagedenic pericementitis." His reasons for this division do not impress the reviewer as being of sufficient force to warrant the change from accepted views. The illustration under the latter heading very faithfully represents a case of pyorrhea.

The chapter on dentition advocates very properly free lancing "as one of the first indications in a severe case in which the gums are swollen, tender, hot, and painful," and with equal propriety advises systemic treatment. The question naturally occurs, Why wait for the gums to indicate "constitutional symptoms" from this cause? The gums, in the reviewer's opinion, should be freely lanced as soon as the child shows nervous reflex excitation.

There is in this chapter no allusion to difficult dentition in the permanent teeth, an omission from the book that greatly reduces its value as an authority.

"Hyperemia of the Dental Pulp" is very well treated in Chapter XXX, but the author fails to notice pulpitis superficialis. This is not, however, specially to be remarked, as the authors of works on dental pathology issued in this country seem to be ignorant of this lesion, recognized by the few. The reviewer would refer the author to the writings of Arkövy and Witzel as confirmatory of this pathological fact. The author describes under "Chronic Pulpitis" what is usually known as hypertrophied or fungoid pulp.

Allusion is again made to Dr. Truman under the head of "Dental Erosion." While quoting the writer correctly, as far as his view of this being caused by acid at night, he states that Dr. Kirk found the origin of this acid in the mucous follicles. While Dr. Kirk did find acid from these, his observation did not cover Dr. Truman's conclusions, but simply indicated another source of supply. The original opinion, based upon experiments, and still held, was and is that active fermentation takes place during all periods of rest, in remote cavities and throughout the teeth at night, when the alkaline saliva is reduced in quantity. The acid thus produced acts independently, and yet in conjunction with the acid from the mucous follicles, and has a direct and positive action upon the labial, buccal, and grinding surfaces of teeth, although the author does not seem to regard acid as a factor in abrasion. Such, however, is the fact, and it is passing strange that writers upon the subject have failed to recognize it.

If space permitted, it would be a pleasure to notice at length other points of interest connected with this valuable contribution to our literature. The suggestions made are not intended in the light of criticism, as that is generally understood, but are given with the hope that this able writer will, in the second edition, broaden the entire subject, especially detailed methods of treatment. From the dental standpoint these are defective. Long quotations, in different type, also detract from the appearance of the book.

The book is issued with the usual attention of The S. S. White Dental Mfg. Co. to details in typography, paper, and general make-up. T.

METHODS OF FILLING TEETH. An Exposition of Practical Methods which will enable the Student and Practitioner of Dentistry successfully to Prepare and Fill all Cavities in Human Teeth. By RODRIGUES OTTOLENGUI, M.D.S. Second edition. Cloth, 8vo. Pp. 219, with 273 illustrations. Philadelphia, The S. S. White Dental Mfg. Co.; London, Claudius Ash & Sons, Limited, 1899. Price, $2.00 net.

The second edition of this valuable work has recently been issued, following the first edition after a lapse of six or seven years. The book has occupied an important place in dental literature on account of its fullness of detail, its clear exposition of the subject, and its thorough and lucid illustration. It is, without doubt, the most complete treatise on the subject of filling teeth ever published, and has been of great value to student and practitioner alike.

The author has made comparatively few (too few, we think) changes from the first edition, considering the natural development of this important branch of practice.

The chapter on the "Preparation of Cavities and Removal of Decay" has been amplified and improved by the introduction of a summary of the investigations of Dr. Williams on the agencies at work in the production of caries and the methods through which they operate. So, also, the subject of porcelain filling and inlays has received greater attention, and been brought fully up to our present state of knowledge.

The chapter on "Green-Stain" has been somewhat extended, while the one on the study of tooth-roots and opening and cleansing root-canals has been both enlarged and improved; but he has overlooked the very valuable Callahan method of using sulfuric acid in opening minute canals.

In discussing the subject of clamps the author, in both editions, has singularly omitted notice of the Hatch and Woodward cervical clamps, the two best forms yet introduced for their especial use. His unqualified condemnation of steel separators seems strange, in view of their general use by our best operators and the inestimable service they render, as attested by nearly all writers upon the subject.

The latest edition shows little if any modification of the author's earlier deliverances upon the subject of matrices, and he asserts that "if separators have worked evil, matrices have proved even a more disastrous delusion;" and further, "the matrix forms the gold so that it becomes impossible to polish it," because "the teeth have not been wedged." Such statements as these, besides being dogmatic, prove conclusively that the author has either never acquired skill in the use of matrices or has never learned how properly to employ them.

Tin as a filling-material is spoken of slightingly, and the author declares that it has little to recommend it save "cheapness." He doubts its therapeutic value. His remarks upon non-cohesive gold excite genuine surprise. Its softness, he asserts, "is a disadvantage, since it renders the material *crumbly*—another property of non-cohesive gold." Again, "Gold loses its cohesive property in proportion as it is condensed." He says he has never seen a case in which the use of non-cohesive gold would be an advantage.

If, as he remarks in italics, "extremists are poor teachers," how about the radical views he holds upon so many points? Still, notwithstanding all criticism, the writer, by his clear style and comprehensive treatment of the subject, has produced a work worthy of careful reading and study by every dental practitioner. S. H. G.

OBITUARY.

DR. THEODORE A. WADSWORTH.

Dr. Theodore A. Wadsworth, of West Fifty-second street, New York city, died suddenly March 18, 1899, from angina pectoris. He was born in Sanquoit, N. Y., and at the time of his death was in his fifty-seventh year. He was educated in New York city, and was graduated from the New York College of Dentistry. He practiced his profession for about eight years in partnership with Dr. John Allen, and afterward alone. During the Civil War he held a position in the paymaster's department in Washington.

Dr. Wadsworth was unmarried. He was a man of charming personality, and his patients all became the doctor's friends. The pastor of Madison Avenue Reformed Church, of which he was a member, said, when conducting the funeral services, "If ever there was a sweet, gentle, true man, it was the dear one who was taken so suddenly to his Father's home. He never spoke evil of any man, nor permitted any one to be spoken evil of in his presence. He was as gentle as a woman, and as manly as any man I ever knew."

DR. ALBION M. DUDLEY.

Dr. Albion M. Dudley, of Salem, Mass., died at his home March 7, 1899. He was born at Boston, in August, 1845, and was educated in the public schools of that city.

In June, 1862, he enlisted in the Thirty-third Massachusetts Regiment, returning home invalided in 1863. On his recovery he joined the Fifty-eighth Massachusetts, and served until after the battle of Petersburg. As a soldier he distinguished himself, winning a lieutenancy and being brevetted captain for bravery.

After the war he entered upon the study of dentistry, and in 1869 was graduated, together with Dr. E. G. Barton, of Reading, Mass., from the Boston Dental College. These two men constituted the entire class, which was the first ever graduated at Boston.

Dr. Dudley took rank with the leading dentists of his section, and until within the last few years was a prominent figure in various dental societies, having served as secretary and as president of the Merrimac Valley and New England Dental Societies, as vice-president of the Massachusetts Dental Society, and corresponding secretary of the American Dental Association. He was an honorary member of the Vermont and New Hampshire Dental Societies, and of the American Dental Society of Europe. He was secretary of the Dental Section of the International Medical Congress held at Washington in 1887.

Dr. Dudley was married in 1871 to Jennie L. Butler, whose mother was a lineal descendant of General Israel Putnam. Mrs. Dudley died in 1875, leaving a daughter, who is still living.

HINTS, QUERIES, AND COMMENTS.

KONIGGRATZER-STR. 140, BERLIN W., May 3, 1899.

TO THE EDITOR OF THE DENTAL COSMOS:

Sir,—I was much surprised when Professor Miller drew my attention to a paragraph in the April number of your valuable journal in which I was quoted by Dr. J. E. Hinkins, of Chicago, as saying the following:

"Dr. HINKINS. I think in Dr. Miller's first work he did make that statement, but in his later work, *and in some correspondence which Dr. York had with him, he changed his first statement. He first made the statement and then withdrew it.*"

I have never corresponded with Professor Miller upon this subject, and can only suppose that Dr. Hinkins unwittingly misunderstood what I told him on my return from Europe last autumn,—viz, that while in Berlin I drew Professor Miller's attention to a paragraph in Dr. Barrett's latest work, in which the latter states that the Delta organism of Miller is the one primarily concerned in caries of the teeth. Professor Miller replied that he had never stated that any one organism was primarily the cause, but that any organism possessing the highest ferment activity, and the highest peptonizing power, and one able to flourish with a limited amount of oxygen, causes a more rapid destruction of the tooth-substance than any having these qualities in a minor degree. See his work on Micro-Organisms of the Human Mouth, page 184.

I might also add that Dr. Truman W. Brophy was present during the conversation.

Hoping you will accord me space in your journal for this very necessary correction, and thanking you in advance, I am,

Yours, very truly,

E. LAWLEY YORK.

MALLETING GOLD FILLINGS.—Commencing on page 357 of the DENTAL COSMOS for April, Dr. C. N. Johnson presents many valuable points on malleting gold fillings. If every dentist could have an expert assistant, I would not care to add anything to what he had written. But as it is impracticable for all to keep an assistant, I can, I think, offer some observations drawn from a long experience, that are worth attention. One who has not practiced malleting for himself until he has become expert with both mallet and plugger cannot judge as to the real advantages such training affords. A poor assistant will cause the dentist more nerve tension, worry, and fatigue than the extra labor of striking the plugger for himself. An assistant is in much greater danger of knocking out an approximal filling than is the dentist who mallets for himself. The country dentist makes few gold fillings in difficult posterior cavities, these latter days, compared with the former custom. Such cavities are the only ones in which the strain is greater on the operator who mallets for himself than would be the case if he had an assistant. With the exception of such difficult posterior cavities, I find it an actual relief to take the mallet in my own hand so I can know the exact force being applied, and can mallet faster than an assistant can. In such cases the assistant is of more value in annealing gold and placing it on the filling than in applying the mallet.

Let me repeat: not all can have good assistants. Until one has become expert in malleting for himself can he judge the matter properly? Then he will prefer malleting for himself at times even if his assistant is the best.—W. E. DRISCOLL, Manatee, Fla.

FOOD IN RELATION TO TOOTH DETERIORATION.—The dentist is often asked to give a reason for the modern deterioration of teeth, and to explain why they decay. Patients expect a scientific answer which will satisfy them, but how often does he feel that his explanation does not satisfy himself, and much less his listeners? Teeth are undoubtedly growing worse; they are softening, are more liable to white decay, more sensitive. Although the profession of dentistry has progressed, the diseases of teeth have become more complicated and less easy to control.

It is always necessary to go to the root of everything if you wish to find the cause; we take step after step and get nearer and nearer to the origin.

These steps—or at least the most evident of them—are hereditary diseases during dentition, anemia after the development of the teeth, local and climatic influences, then water, and lastly food. This last is, through fermentation, a great cause of trouble with teeth if they are in a weak condition. But we shall probably have to go back farther than this and investigate the preparation of food for modern life. I do not mean in the kitchen (though some causes might be traced to complex cookery), but the fields where our corn and vegetables are grown. We all know that the food placed on the market is mostly forced; that is to say, it has an unnatural growth. It has been made to grow rapidly, so that it is impossible for the vegetable to have absorbed from the ground the nutritive and healthy elements which would make it a substantial and nourishing article; in all its parts the true elements are replaced by inferior and putrefied manure, which is more easily absorbed by the plant. Now, it may not injure humanity to make occasional use of these artificial substances, but if for years and centuries (taking into account hereditary influences) humanity has been nourished on food which has not in itself, except in semblance, the required elements, it is natural that an evident and progressive deterioration should follow.

And what we have said of vegetables applies equally to meat. The food of cattle consists, chiefly, either of chemical compositions or of vegetables which are nothing more than modified manure and putrid matter with the appearance of healthy food.

Now take as an experiment a vegetable grown in its natural state without the aid of modern gardening and stimulants. It will probably be smaller and may not look so good as a similar production which has been forced on strong "fertilizers"; but cut off a part of each and place the two in the same condition, and you will see which will more rapidly wither and decompose. It should be a subject for the investigation of modern science to discover whether, since teeth are evidently suffering, the whole system may not be suffering too, and whether the origin of many diseases that medicine can do little to alleviate may not be traced to this cause.—EDWD. DUNN, D.D.S., Florence, Italy.

A MONTHLY BIBLIOGRAPHY OF DENTAL LITERATURE.

COMPILED BY J. MELVIN LAMB, M.D., D.D.S., WASHINGTON, D. C.

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LIST OF UNITED STATES PATENTS

PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING APRIL, 1899.

April 4.—No. 622,359, to JOHN HOOD and STEPHEN H. REYNOLDS. Dental engine.
" " No. 622,467, to HORACE D. HERMANY. Dental engine.
" *11*—No. 622,670, to WILLIS H. DWIGHT. Tooth-crown.
" " No. 622,922, to WM. P. HORTON. Apparatus for administering therapeutic electricity.
" " No. 622,948, to MARY P. GILL. Rotary tooth-brush.
" " No. 623,026, to ADAM J. MAY. Dental chair.
" *18.*—No. 623,469, to JOHN G. HAILER. Dental hand-piece.
" *25.*—No. 623,751, to CEPHAS WHITNEY. Artificial tooth-crown and backing.

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ORIGINAL COMMUNICATIONS.

PARTIAL REMOVAL OF CEMENTUM AND DECALCIFICATION OF TOOTH IN THE TREATMENT OF PYORRHEA ALVEOLARIS.

BY HOWARD T. STEWART, D.D.S., GREENVILLE, MISS.

(Read before the New York Odontological Society, March 21, 1899.)

"ABOUT one hundred and thirty years ago a dentist of London published a work in which he advocated a treatment for pyorrhea almost identical with that now pursued by Junius Cravens." This we are loath to believe, for it proves no advance has been made in this direction for more than a century.

Dr. Trueman, in speaking of extracts quoted from other writers of the same period, says, "How very like the remarks in reported discussions on this subject in this year of grace 1896 are these culled from writers of more than a century ago! Writers who were well conversant with, and who have accurately described, this and other allied disorders of the teeth and gums that, in their day as well as in ours, in spite of their efforts and in spite of our efforts, result in a much-to-be-deplored tooth loss.

"With them, as with us, whether these disorders were wholly or in part systemic was a much debated question; indeed, a careful study of the accurate and full records they have left us makes us ponder, and prompts the question, What do we know of these disorders that they did not know?"

In 1893, at the World's Columbian Dental Congress, Dr. George B. Clement, of Macon, Miss., exhibited microscopical specimens which showed conclusively that the cementum of a tooth affected with Riggs's disease was denser than that of one unaffected, and that in each and every case not only the structure of the cementum was denser, but that the lacunæ and canaliculi were partially or wholly obliterated. This condition is not found in a tooth free from the disease. In regard to theories that have been advanced as to the etiology of the disease, Dr. Clement further says, "that if this disease was of germ origin it would be at least contagious, if not infectious, and we would find few mouths which would escape its dreadful ravages." That if it were but the local manifestation of a specific micro-organism it would yield to germicidal treatment, and recurrence would only be after a secondary infection. "That germs pass in after the lesion is made, and that they are at all times present wherever inflammation occurs we agree, but as a specific cause of this specific disease we say 'no.' That if calculus was the cause the removal would cause a cure, and as to sanguinary calculi, it could be but the result instead of the cause of pyorrhea alveolaris, as it is due to and depends upon inflammation as a cause of this formation. Like the pearl, it is but the solidified exudate of a wound. The simple fact that many cases exist where not a vestige of salivary or sanguinary calculus is present precludes the possibility of any such agent acting as a fit cause."

Again, he says that out of many specimens examined for uric acid more than one-half fail to show the slightest trace of it. This of itself is proof conclusive.

We admit that many systemic troubles have a tendency to aggravate a specific case of pyorrhea, but in all such cases the exaggerated symptoms disappear when the disease is cured. M. L. Rhein, of this city, has classified pyorrhea into pyorrhea rheumatic, lead, lithic, diabetic, Bright's disease, tubercular, typhoid, pregnancy pyorrhea, etc. He states that these diseases are the specific cause of pyorrhea. When asked why the pyorrhea was not cured with the disease, his answer is "that the disease leaves the parts in such a low state of vitality that the pyorrhea continues." We hardly think this possible. Dr. Clement says, "We claim that in some way and by some means the cementum, in a physiological condition, affords through the periosteum or peridental membrane a vital union with the tooth and organism. As long as this relationship is sustained we have no serious trouble, but if the density of the cementum be carried beyond its physiological condition by hypercalcic deposit or infiltration the result is exfoliation of the tooth; because by a perverted nutrition we have an interference with those conditions by and through which only is there hope of vital union."

Our treatment is based on the supposition that the organic matter of the cementum is replaced by calcific matter, the whole structure becoming very dense and shutting off vital connection between the tooth and the organism at large. The peridental membrane being no longer able to perform its function, dies at that point.

We now proceed to the details of the operation. Whatever be the cause, whether associated with either salivary or serumal calculus, or none at all; whether the pockets be deep and easily penetrated, or the sensitive gum adheres firmly to the tooth; whether pus be noticeable or not; whether the teeth are loose or firm, the treatment is the same, which is as follows:

The gum being cleansed with an antiseptic solution, a little carbolic acid is applied to the point at which the needle is to enter, to slightly anesthetize it, and a three per cent. solution of eucain is injected into the gum around the tooth.

Next comes one of the most important steps of the treatment, and you will observe just here a most essential difference exists between this and the usual modes.

A thin, flexible, chisel-shaped lancet is now carried down by the side of the tooth to the alveolar process and passed all the way around the tooth, thus completely separating it from the overlying gum. The lancet is three-edged, cutting on the point and sides. If no discoverable pocket be present the lance is just as freely used. The effective use of this instrument usually obviates the difficulty of treating cases where "galleries" (as Dr. Cravens calls them) are present.

Now, this operation, under the influence of eucain, is absolutely painless, and gives us access to the root, which we proceed to scrape and chisel heroically all around, especially about the part covered by the pocket. This is not to be merely scraped sufficiently to remove the diseased part of the membrane, but the cementum itself is removed to a considerable depth. A speedy and permanent cure is impossible unless this be done.

In addition to this, the overlying gum is to be thoroughly lacerated, and diseased portions of the process removed.

You will notice that the inside of the gum over the pocket is less sensitive than the outside. That is, the outer surface is more sensitive to a wound than the inner surface lying against the tooth. This is because of a tough lining tissue, which has been thrown up to protect the gum from the pus.

Cravens speaks of this surface of the gum as being "glazed,"—a very happy word. This is freely lacerated and torn away to induce new granulation and a reunion of the gum with the tooth.

Now, with a very sharp, fine-pointed excavator fine grooves are cut in the cementum well down under the gum. The object is to afford a better place for deposit and attachment of new tissue. Care is taken to leave these rough surfaces well below where the line of attachment will be, for if they extend above the gum-margin after the wound is healed they would naturally invite decay. These grooves are often cut with a small-size bur extending to a considerable depth below the alveolar process. Usually about four grooves are cut on each root. Into these grooves new bony tissue is soon deposited, and greatly tightens the tooth.

My method at first was to leave a smooth surface, but I found later that better results were obtained when it was left roughened. The pockets are now washed out and pure sulfuric or hydrochloric acid is applied with a platino-iridium wire, flattened at the point. This acid is repeatedly applied, wiping away the blood which oozes quite rapidly out of the wounded pocket. The object is to keep the acid in contact with the scraped part of the cementum long enough to decalcify the surface. I would emphasize the importance of doing thorough and heroic surgical work, as the medication is useless without it. Too much stress cannot be laid on the importance of thoroughly and deeply scraping the roots and lacerating the tissues. It is almost impossible to overdo it. Of course, we get violent inflammation, but that is what we want. I have never known the new tissue which is thrown up to be re-attacked by the disease. Scrapers should be stiff enough to allow considerable force to be used, and should cut like excavators.

I reiterate what I have before said about this part of the treatment, because with the surgical work that is usually done there is no such thing as cure of Riggs's disease.

As Dr. Lawrence says, "If your surgical work is not perfectly done, I do not care what your medication is, you may inject till doomsday and you will not get the desired result."

It is natural for you to think that this is all very easy to put down on paper, but that the practical work is another thing, and I readily grant you that "I can easier teach twenty what were good to be done than to be one of the twenty to follow my own teaching."

This work is difficult indeed, and the skill requisite for its performance is not easily acquired; it comes only after years of patient cultivation.

There is no operation in all dentistry that so taxes the skill and patience of the operator, and none which at times is so discouraging to his efforts; but there is also none which gives more satisfaction in the end. After the acid has been kept for several minutes in contact with the cementum, the gum is again slightly lacerated and the pockets filled with fresh blood. Keeping this protected from the saliva a few moments completes the operation. For a long time I protected the parts by flowing over them a protective covering, but the healing process seems to be equally rapid and effective without it. Now, noting that the occlusion is correct, and that the tooth is steadied with a ligature if very loose, we dismiss the patient with a prescription of permanganate of potash, one grain to the ounce. This is to be used every hour for several days. Listerine, borolyptol, Pasteurin, or euthymol can be substituted, and are more pleasant to the taste, but the permanganate is the most reliable. The tooth-brush and toothpick are to be discarded for a few days, and the mouth rinsed night and morning with a solution of bicarbonate of soda, the strength of which is immaterial. This has a magical effect on the suppurating gums. In addition, some astringent wash is also prescribed to be used two or three times a day. A little tannic acid can be added to the listerine.

All this, of course, is not absolutely essential; for instance, the listerine and tannin alone would answer.

The prescription for the washes completes the treatment. There is no secondary treatment at the chair, the constant use of these washes being now all that is necessary. No further attention is given to this tooth for one month, when it is examined; and if it is not healed and tightened to our satisfaction the same operation is simply repeated.

Sometimes the most effective way to tighten a stubbornly loose tooth is to devitalize and remove the pulp and treat from the inside, as well as the out. After an observation of many years, I am prepared to say that the removal of a pulp will in all cases aid in the cure of pyorrhea, but I would not be understood to advise this in any except the advanced stages. When a third or more of the pericementum is gone, I would devitalize without hesitation.

The removal of the pulp alone will aid to a great extent in curing the disease, but we rely more on the effect of the acid now introduced into the canal. This canal is reamed out as if about to receive a post for a crown, and a ten per cent. solution of the acid carried well down to the end and sealed by a cement filling in the orifice of the canal. In two days this is removed, canal thoroughly washed out, and acid again applied. The acid renders the root somewhat tough and springy, and it is then ready to fill and turn over to Dame Nature. We trust to the acid being diffused through the structure of the root, softening to a certain extent the bony tissues, and stimulating a renewed vital action.

Just what effect the acid has within the canal, also without, I do not know, except that it induces a connection between the gum and the tooth and binds the tooth more firmly in its socket. If, as Dr. Clement has clearly shown, the canaliculi of these teeth are wholly or partly obstructed by the deposition of calcium salts, thus destroying the vital relation between pericementum and cementum, may it not be that the acid has some solvent effect upon the calcium salts in the partially obstructed canaliculi? And may it not thus penetrate the canaliculi and stimulate to renewed activity the vitality still remaining in the sluggish tissues therein contained?

And may it not be that the new tissue which is formed throws out its ligaments into the cementum, and that new bone is deposited about the decalcified surface? Certain it is that there is formed a connective tissue which is very firm and stable in its attachment. Now, all this treatment you will say is impracticable,—that it involves too much time and expense, and that it would be better to extract the teeth at once; and in most cases I grant you this is so, but sometimes it is extremely important to retain some particular tooth in its position, and then no reasonable amount of trouble is too great in order to save it; that is, of course, if your patient is intelligent enough to understand the importance of keeping it in place and is willing to pay you for the time expended. Sometimes, when all else fails, the tooth is extracted, operated on outside the mouth, and replaced. When this is done ligatures should not be trusted to hold it in place; a gold band cemented about this and the adjoining tooth is always to be used. For lower front teeth these bands are especially useful. Suppose the incisors and cuspids are very loose. The first step is to band each tooth with a very thin, narrow piece of pure gold plate, letting it cover only a small portion of the tooth just below the cutting-edge. These bands, being of pure gold and quite thin, are easily bent and burnished to the loose teeth. Then an impression is taken with the bands all in place, allowing the impression material to just cover the bands. A plaster and sand model is run, and the bands are joined by a bit of solder between each. This gives you your bands joined in precisely the proper position, or each band can be joined to the adjoining one with sticky wax, removed and soldered. Should a tooth be missing, a dummy can be soldered in. This appliance for the present is not to be cemented in, but placed on the teeth between operations and cemented when the surgical work is all done. It is also useful at times during the operation to steady a very loose tooth. Small bars can be placed in the cutting-edge and filled around in place of bands.

Molars and bicuspids, when so loose as to be almost useless in chewing, can be made comparatively steady by placing a connecting bar in the grinding-surfaces. Suppose the second and first molars and both bicuspids are quite loose; a groove is cut with a corundum disk across the grinding-surface of each as nearly in a straight line as possible, and a bar bent to accurately fit. This groove must be deep enough to allow the bar to lie out of the way of the opposing teeth, and wide enough to be well surrounded by the alloy which is to hold it in. This is no easy task, and is not so simple as it looks, as you will find if you try the operation. Of course, this involves quite a loss of tooth-structure, but that is scarcely to be considered when the teeth are loose enough to need this support. I have found usually that it is better to cut such teeth off even with the gum and crown them. The natural crown and that portion of the root above the gum draws on the vitality of the little pericementum still remaining, to some extent. If this is all cut off even with the gum and replaced by an artificial crown, the vitality is all confined to that part of the root which is left; the roots become much firmer under this condition than when the natural crown is left.

We often find one root of an upper molar affected to such an extent that it is almost wholly denuded of its pericemental covering, and has almost entirely lost connection with the surrounding tissue, acting as a foreign substance, while the remaining roots seem almost unaffected. In this case the diseased roots should be amputated, the contiguous parts first, and the acid applied. The lower molars we find in the same condition, having one root wholly or nearly dead, while the other is only slightly affected. The badly diseased one is amputated, leaving the healthier one to operate on to help support a crown or bridge.

I would not be understood to convey the idea that it is wise to attempt to save every tooth or portion of tooth simply because it is possible to do so. Not at all. I only claim for this method that the disease can be stopped at the point to which it has progressed, and the remaining tissues restored to health. No claim is made to restore lost tissue to any very considerable extent.

If a tooth has lost nearly all its pericemental membrane and alveolar process, being very loose and having only its apex slightly attached, it is foolish to attempt to retain that tooth, even though it could be tightened to some extent; and here I will say that this operation is made wonderfully more useful when combined with a skillful and cleanly system of mixed bridge-work. In the advanced stages of the disease I think I am safe in saying that it is at least three times as much value with the bridge-work as it is without it. I know this is a bold statement to make, especially before a body of men the greater part of whom condemn fixed or extensive bridge-work. Ninety-nine per cent. of the dentists condemn very extensive bridge-work, and three-fourths of them condemn fixed bridge-work of all descriptions; at least they do not use it in their practice, which is the severest of condemnations; and those men do wisely, for few indeed have the especial talent for that especial work. Many of the finest operators I know have no gift in this direction. Besides, bridge-work has not had a fair trial. Busy operators do not take the time to serve an apprenticeship at bridge-work, such as they did at operating. They indifferently construct caps and crowns for abutments, take an impression, and leave the making of the piece to some mechanical man who can flow solder and put a beautiful polish on gold, but who understands little or nothing about the artistic construction of a piece of bridge-work and the laws which govern its usefulness and cleanliness. The operator now inserts this beautifully polished piece of work in the mouth and watches with intense disgust the almost scientific way in which it acts as a receptacle for filth, irritating the surrounding tissues and tainting the breath. This is extremely discouraging, but he sees that the bridge might be constructed in a better manner; so, instead of turning the next one over to the mechanical man, he resolves to construct the entire piece himself. Having made perhaps not more than one-half dozen bridges in his life, and being entirely unpracticed in this, he gives the same amount of time to a one hundred dollar bridge that he would to five hundred dollars of operating; succeeds little or no better than the mechanical man, and at the next dental meeting denounces in unmeasured terms all fixed bridge-work as a delusion and a snare. This man has not given the work a fair trial. He expects to do with the first two or three attempts what it requires years of patient labor to accomplish. True, it may pay that man financially to devote his time to operating and let the bridge-work severely alone, but he should not on that account condemn the work of men who are as scientific in this as he is in operating. It is our firm conviction, after a very large experience in this work, that a properly constructed and inserted fixed bridge is kept equally as clean as the natural teeth; and where these natural teeth suffer from badly polished approximal fillings or flattened surfaces at the hands of indifferent operators the bridge is infinitely more cleanly, but because these places between the natural teeth afford a repulsive receptacle for decomposing food and stagnant saliva we should not for that reason condemn all approximal fillings.

Supposing a saddle is placed on the inferior ridge, covering a large part of it, forming such a chamber as to collect food and to render cleansing impossible, is removed even after a few days and found to emit a foul odor, we should not for that reason condemn a flat or oval-shaped rest which tends to be self-cleansing, and every part of which can be readily reached and cleansed with a silk thread.

I lay such stress on the defense of this work because without it the operation for pyorrhea in the very advanced stages would be comparatively useless. About three years ago I began an operation for pyorrhea and bridge-work which was the most unpromising of any I have ever known any one to undertake. The patient was about seventy-five years of age. In the upper arch were, on the left, the second and first molars and the cuspid; on the right the central and cuspid. Two molars on the left were quite loose, with both palatal roots completely separated from the gum-tissues, acting simply as foreign substances. The buccal roots were comparatively free from the disease. Both crowns and both palatal roots were excised, leaving only the buccal roots, with a very small portion of the crown. The central and two cuspids were so loose that they could be easily pushed around with the tongue. Pockets extended up almost to the apex, though the gum had receded but slightly. These cases where the gum overlies a large surface are the most favorable ones for a deposit of bony tissue. The pulps were first taken out of these three teeth and, leaving the crown for the present to act as a rest for the thumb, they were, after the injection of the anesthetic, operated on vigorously, removing much of the external part of the cementum and deeply grooving what was left. These grooves were very narrow, but extended (some of them) through the cementum into the dentin. Acid was now applied to the cementum for several minutes, and a five per cent. solution carried into the canals and sealed up. The remaining roots of the molars were now operated on, and the patient was instructed to use mouthwashes continuously. The crowns of the central and cuspid were excised to prevent being moved about by the tongue. These teeth were now so loose that they seemed ready to drop from their sockets. I watched those teeth with much anxiety, and could see no improvement whatever for three or four weeks, but at the end of that time they began to tighten, and grew tighter and tighter for three months. They had then so much improved that I considered it safe to begin the bridge-work.

At the beginning of this operation almost any dentist would have pronounced this attempt as the work of a madman, and, to tell the truth, I myself inclined to the same opinion. However, when the teeth had so much tightened at the end of three months, I went on with renewed courage. Caps were fitted to all the roots and an impression taken. The process on the right had so absorbed that it was absolutely flat, and presented an extremely broad surface. At this point the model was deeply scraped. A rest, very slightly oval-shaped, was placed here to cover the entire ridge of the cuspid back to the second molar. When the bridge was placed in the mouth this rest pressed hard into the gum over the ridge, and would not allow the cap to come into exact position without very hard pressure. The piece was worn several days before being cemented. The pressure of the lower teeth soon caused this oval-shaped rest to bury itself somewhat in the gum-tissue above, and allowed the caps to go to place on the teeth. The bridge was now cemented in position, and the outcome awaited with feverish anxiety. The result was successful to a degree that far exceeded my expectation. Nearly all the chewing was done directly over the rest. Why it was more comfortable to the patient to chew there than on the other side I am not prepared to say. This rest caused not the slightest irritation to the tissues, and could be thoroughly cleansed and polished by running a silk thread over it. Being slightly oval, it allowed the silk to touch every point not reached by the brush.

Now, I hope you all believe this story. I should feel hurt if you did not, but I confess that were I in your position and you were telling the story I should have my doubts. However, I have some proof. It was an examination of this case and a conversation with the patient which induced my New York patient to apply to me for treatment. The mouth of this patient also shows well the advantage of bridge-work in connection with the operation for pyorrhea. One of the upper first molars had only the palatal root in good condition. The crown and both buccal roots were excised. The palatal root was operated on three months ago. It is now quite firm and solid. Onto this is fitted a gold cap. Over this cap is soldered a gold cusp with porcelain facing. A bar extends from this into the adjoining bicuspid to steady both teeth. In the lower arch on the right are no teeth back of the bicuspids, one of which was almost entirely denuded of its pericemental membrane, and the other was seriously affected. On the one is placed a half-cap, on the other a Richmond crown, with a rest for the ridge similar to the one already referred to. The bridge is connected with one on the opposite side by means of a round, iridio-platinum bar (No. 12), which lies just beneath the lower front teeth, half buried in the gum-tissue. This bar is a wonderful support, gives rise to no irritation, and seems never to be noticed by the tongue after two or three days. On the other side there are three roots (two molars and one bicuspid) which were very loose indeed three months ago, but now are quite firm. The bridge at this end of the bar rests on these roots and the cuspid, over which is a half-cap. This bridge is not yet completed.

The question naturally arises, How long will these roots sustain a heavy piece of bridge-work? My experience so far proves that the tendency is constantly to tighten instead of loosen, if the surgical operation was thoroughly done and if the occlusion is exact. The bridge must be a fixed one. All removable appliances of whatsoever description are to be wholly condemned. They may steady the teeth for masticating purposes, but they hasten the final end. It is also natural to ask if we can be sure the disease will not return some time in the future, even on the teeth that were slightly affected. To this I can only answer that in an experience of several years the disease has returned either in a few weeks or not at all. This is as nearly proof conclusive as we could have without the actual passage of years that there is a permanent cure. We look for gradual and continued improvement for six months after the operation.

This operation seems barbarous, but there is really very little pain attached to it. There is no feeling whatever in the gum after the injection of eucain, and you all know that teeth affected with pyorrhea are not usually very sensitive to the touch. Scraping the cementum is far less painful than excavating a sensitive cavity.

What little work is necessary to be done on the alveolar process is comparatively painless. Of course, the parts are left in a highly inflamed state, but inflammation is what we want. From constitutional treatment I have never obtained any but the most transient results. The symptoms sometimes respond readily, but it is only a question of a short time when the teeth return to their former condition. For this reason I cannot believe constitutional conditions to be the cause of this disease. I am firmly convinced that the theory advanced by Dr. Clement is the true one. On his theory I formulated my treatment; and if results from it are any proof of the correctness of the theory, I think we are no longer ignorant of the etiology of pyorrhea.

The constitutional theory is a very ingenious and reasonable one. While talking with Dr. Rhein and listening to his exposition of this theory which he so plausibly and so reasonably placed before me, I was almost for the time converted, but when I said to him that it must be that the systemic troubles were only a source of irritation to the part and an aggravation of the disease he turned impatiently on his heel and said, "Oh, doctor, you are so near the truth, why don't you go one step further and grasp the whole truth?" And I say, God grant that I may! It is the truth I want. If my theory is incorrect or my remedy inadequate, there is no one more anxious to know it than I. As yet I feel that but the first step has been taken. May many more follow. May the feeble rays that are now shed on this subject be "the first dawnings that shall open little by little into a full and clear light," and may the darkness in which we have so long been groping merge at last into a grand and glorious day. I feel that I have done but little, but if by laying this accidental discovery before you, who are abler than I, you will be stimulated to carry on this work until the "whole truth" is grasped, I shall feel that I have done you, the profession, and humanity at least some good.

A FEW CONSIDERATIONS IN FILLING TEETH.

BY C. N. JOHNSON, L.D.S., D.D.S., CHICAGO, ILL.

(Continued from page 538.)

THE INTRODUCTION, CONDENSATION, AND FINISHING OF GOLD FILLINGS IN OCCLUSO-PROXIMAL CAVITIES IN BICUSPIDS AND MOLARS. (*Continued.*)

Disto-occlusal fillings in left lower bicuspids and molars.—With the matrix in place a rope of non-cohesive gold of suitable size should be grasped with the pliers and one end carried into the cervico-lingual angle, and the rope folded on itself at convenient intervals along the cervical wall toward the buccal wall. If the rope is not of sufficient length to reach entirely to the buccal wall when thus folded, another rope should be started in the cervico-buccal angle in the same way and the two ropes joined. With a mass of non-cohesive gold thus laid along the cervical wall, the condensation should begin by taking a square-faced plugger with a serrated area as broad as the width of the cervical wall mesio-distally, and bringing it down on the gold with hand pressure toward the cervico-lingual angle. A plugger of this size will carry the gold ahead of it instead of puncturing it, as would be the case with one of too limited area; and if operated in the swaying motion already described it will insure perfect adaptation of the gold without the rope following the plugger out of the cavity.

When the plugger has been brought to bear on the non-cohesive gold at several points along the cervical wall, so as to compress the gold partially into position, a cylinder of cohesive gold wide enough in diameter to reach from the axial wall to the cervical enamel-margin should be laid in the cervico-lingual angle with its side upon the gold already in place and one end looking along the cervical wall, while the other is slightly tipped up against the lingual wall and looks along this wall. This should be forcibly driven into the structure of the non-cohesive gold in the direction of the cervico-linguo-axial angle by hand pressure with a smaller plugger exerted in the swaying motion, and when securely pinned into place, by bringing the plugger to bear on it at several points in this manner, another cylinder may be laid a little farther along the cervical wall toward the buccal wall, but still lapping the cohesive cylinder already in place. This process should be continued with hand pressure till the cohesive gold reaches across the cervical wall to the buccal wall, and especial care should be taken to force the last cylinder so placed securely into the cervico-buccal angle. When the filling is thus locked in position the mallet may be used to condense the entire mass, starting the plugger at either the cervico-linguo-axial angle or the cervico-bucco-axial angle, as the case indicates, and carrying it step by step across the cavity, directing it first along the cervico-axial angle. The object is to secure the greatest degree of adaptation and density in this angle, to the end that the filling may be so seated in position that there is no possibility of subsequent movement from manipulation. A convenient form of plugger for this purpose is found in Fig. 50.

After density is gained along the cervico-axial angle a broader-faced plugger may be used to condense the remaining gold, provided the area of the cervical wall is great enough to call for it. Usually in bicuspids the width of the cervical wall mesio-distally is so limited that the form Fig. 50 is as large as can conveniently be used.

When the gold is thus malleted down upon the cervical wall the plugger should be directed into the angle formed by the junction of the matrix with the margin of the cavity, and the gold should be carried against the matrix and over the entire cervical margin. This will force the matrix slightly away from the margin as previously advised, and insure perfect adaptation of gold over the enamel.

The operation now presents with the cervical portion of the filling in place, a cushion of non-cohesive gold lying against the cervical wall with a layer of thoroughly condensed cohesive gold covering it, and the whole mass securely seated on the cervical wall and locked between the buccal and lingual walls. A filling thus started in a cavity of proper form cannot by any means be made to rock or loosen with subsequent manipulation. It is firmly seated on a flat base and supported laterally by perpendicular walls, so that there is no possibility of tipping, provided the gold has been well adapted and made dense. The virtue of creating angles to join the walls of these cavities, as advocated in considering their preparation, is now especially apparent to the operator as he starts the filling. There is a sense of security to his work obtainable in no other way.

The building of the filling from this stage to the point where the approximal portion of the cavity joins the occlusal anchorage step is simply a process of laying the cohesive cylinders on the gold already in place with their ends looking buccally and lingually, and malleting firmly to place. These cylinders should be wide enough to reach from the axial wall to the matrix, and the filling should be kept as high along the matrix as along the axial wall. When a cylinder is placed near the buccal or lingual wall the end should be turned slightly up against this wall, so that when condensed it will leave the filling a trifle higher along these walls than at other points. This is to insure the possibility of directing the plugger against these walls, and also to avoid the danger of leaving a pocket between the condensed gold as it approaches the occlusal surface and any possible overhang which may exist in the cavity at this point. This overhang relates to two conditions, either where it has not been possible to make the cavity as wide bucco-lingually at the marginal ridge as at the cervical margin, or where decay has so eaten up under the cusps that an arch is formed to the cavity under which the gold must be adapted. It is not always possible or at all advisable to cut up through this arch so as to create a perpendicular wall to the cavity for facility in building the gold. Neither of these forms of cavities may be considered ideal, but in the mouth we must meet the issue of reality as well as ideality. In cavities thus formed the gold must be kept higher along the buccal and lingual walls than at any other point, and if a pocket should be encountered on approaching the occlusal aspect of the cavity some non-cohesive gold should be wedged into it.

When the filling is level with the anchorage step on the occlusal surface a cylinder should be laid with ends looking mesially and distally, one half over the gold already in place and the other extending into the step. After this is condensed another cylinder should be laid in the same way a little farther along the step, but still lapping the condensed gold, and this process continued till the base of the step is covered. By this arrangement of the cylinders the approximal portion of the filling is most securely locked into the step. The malleting should be especially thorough along the angle formed by the base of the step with the surrounding walls, and from this point to the completion of the filling each cylinder should be carefully laid on its side precisely at the point where it is intended to condense it; and this cylinder should be made perfectly compact before another is added. This conduces to an even and uniformly dense surface to the filling.

As has previously been intimated, there is one point in building these fillings which requires especial attention with relation to its density. While the gold is being built against the matrix-wall, and the matrix is thus forced against the contact-point of the approximating tooth, the greatest care should be exercised in malleting the gold firmly against the matrix in this region to insure a hard, dense contact-point on the filling. The ability to accomplish this with ease forms a not unimportant argument in favor of the matrix for these distal fillings.

PLUGGERS.

The form of plugger found most serviceable for carrying the non-cohesive gold to place in starting the filling is found in Fig. 56. This plugger is large enough to carry the non-cohesive gold in front of it instead of puncturing it. The serrations are comparatively coarse and deep, thus leaving an indented surface on the gold to facilitate the interlacing of the cohesive with the non-cohesive. The shank is heavy and rigid, permitting of great force without springing; and the curve is such that the cervical wall of most cavities can readily be reached with it.

FIG. 56.

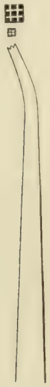


FIG. 57.

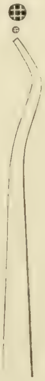


FIG. 58.

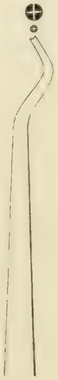
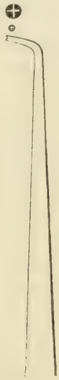


FIG. 59.



For forcing the first pieces of cohesive gold to place in the angles Fig. 50 is admirably adapted, and in cavities which are narrow mesio-distally most of the filling may be built up with it. It is also especially useful along the matrix-wall. In cavities of broader area the form illustrated in Fig. 57 may be utilized, except for the angles or against the matrix. These rounded forms are not indicated along straight perpendicular walls, but for building the main body of the filling they are sometimes very useful.

In cavities far back in the mouth the curve in Fig. 57 will not always be found great enough, and in this event Fig. 58 may be utilized. This will reach where Fig. 57 will not. But even with this plugger there are many places in these distal cavities which cannot be reached with mallet force at all, and then resort must be had to right-angle pluggers and hand pressure. A convenient size for this is shown in Fig. 59. This plugger may be used along the buccal and lingual walls of these cavities, and, in fact, in any position not accessible to mallet force.

One great aid to the building of these disto-occlusal fillings on the left lower teeth relates to the position taken by the operator. It is frequently of the greatest possible advantage to go around to the left side of the patient and approach the cavity from this aspect. This will often bring the cavity into more perfect view and give better access with the plugger. The lingual wall will ordinarily by this means be so presented to the operator that he can mallet his gold directly against it.

The point of all others where failure in adaptation to walls is most often manifest in these—as, in fact, in all disto-occlusal cavities on the lower teeth—is along the wall which stands nearest to the operator. The lingual wall on the left side of the mouth often suffers in this particular unless the operator avails himself of the advantage of condensing from the left side of the patient at such intervals in the work as may seem desirable. This practice will also be found effective in those cases on the molars where the occlusal portion of the cavity involves the fissures so as to extend across the tooth bucco-lingually and pass between the mesial and distal cusps. The wall of the cavity which stands nearest the mesio-lingual cusp cannot be reached by mallet force from the right side of the patient, but by passing to the left the operator may get convenient access to it. In working from the left side the mirror should be used in the left hand, to hold back the angle of the mouth and reflect light into the cavity, while the plugger is being used in the right. The pluggers indicated for this work must be suggested by the demands of the particular case, but ordinarily such forms as Figs. 50 and 58 will be found effective. The latter is especially useful in building the bulk of many of these large fillings, on account of the reach occasioned by the curve in the shank and the angle at which it is thus possible to present the serrated end to the gold.

Finishing the Filling.

When the matrix is removed a thin burnisher should be used to go along the margins and press down the slight excess of gold over the enamel, after which a narrow finishing strip may be passed into the interproximal space and the cervical portion of the filling dressed even with the surface of the tooth. On account of the close contact, it will ordinarily be found impossible to force this strip between the teeth from the occlusal aspect, in event of which it may be passed end-foremost into the space from the buccal aspect. When the ends are drawn forward in the mouth they are readily grasped by the fingers of the operator, and are more conveniently manipulated than is possible where an attempt is made to use a strip on a mesial filling. The strips used should be narrow enough to play back and forth in the space without danger of dressing down the contact-point.

When the cervical portion of the filling is perfectly finished, a sand-paper disk may be used in the engine to play along the buccal and lingual margins as they approach the occlusal surface and dress the filling even with the surface of the tooth, but the disk should not be allowed to pass between the teeth, through danger of cutting down the contact-point and creating a flat surface. The disk may also be used to advantage to smooth that portion of the occlusal surface of the filling which slopes from the contact-point up toward the cusps, by tipping the disk slightly and forcing it into position with a ball burnisher.

To polish the approximal surface of the filling immediately at the contact-point a broad, fine finishing strip should be used, merely with the object of smoothing the gold, without cutting it away. If the filling is so tight against the approximating tooth that even a thin strip cannot be passed between the teeth, a separator may be employed to gain the slight space necessary, or, if this is not practicable, the broad, thin burnisher previously mentioned in connection with the finishing of approximal fillings in incisors may be forced between the teeth and manipulated with a rotating motion till the gold is burnished smooth and the way cleared for the introduction of the polishing strip. This broad burnisher will be found very serviceable in all these contour fillings where contact is close, and it should be in the hands of every operator.

When the approximal surface of the filling is thus dressed to form and polished, the rubber-dam should at once be removed and the occlusal surface ground to form with corundum stones kept moist. The patient should be instructed to close the jaws frequently to test the necessary fullness to which the filling may be left without interfering with the occlusion, and in the event of a sharp cusp from the opposing tooth striking so far into the filling as to necessitate grinding it too thin, it is always advisable to shorten the cusp of the opposing tooth somewhat rather than make the filling weak and render the filled tooth subject to the danger of being split in mastication. When the filling is ground to the proper form with the stone it may be finished with a moose-hide or rubber point carrying moistened pumice till all the scratches left by the stone are removed, after which a high polish may be given it with whiting.

Disto-Occlusal Fillings on the Right Lower Bicuspids and Molars.

The same general plan of building these fillings may be followed as has been suggested for the left side of the mouth, except in one important particular. The buccal wall of these cavities on the right side of the mouth is almost invariably inaccessible to mallet force, and it would therefore seem necessary to build the filling along this wall by hand pressure with a plugger formed like Fig. 59. This should be grasped in the palm of the hand and the gold vigorously pulled against the buccal wall, and particularly into the angle formed by the junction of the buccal with the axial wall. Occasionally it will be found necessary in teeth far back in the mouth to build the entire cervical third of the filling with hand pressure, but ordinarily mallet force may be employed on all parts of the filling from the cervical wall up, except along the buccal wall.

Another point where right-angle hand pressure is indicated in these fillings is in the angle formed by the base of the anchorage step and the mesial wall of the step. This is a wall which looks away from the operator, and the base of the step cannot be seen at this point except with the mirror. It is therefore impossible to reach it with direct mallet force, and the strong right-angle plugger should be employed to lock the gold into this angle and build it up to the point where the mallet blow is effective. Unless this precaution be taken, there is quite likely to be a bridging of the gold over the angle and a subsequent leak in the filling.

Disto-Occlusal Fillings in Upper Bicuspids and Molars.

The plan of building these fillings is practically the same as for lower teeth, except that mallet force may be more uniformly used here than on the lower jaw. Except in rare cases, the only place where the mallet may not be used after the filling is started is along the buccal wall of cavities on the left side of the mouth. In this position it is often necessary to work by the aid of the mirror and adapt the gold with a large right-angle plugger grasped in the palm.

For the bulk of the work, when the filling has reached the point where mallet force may be used, such forms as Figs. 50, 57, and 58 will be found effective.

Mesio-Occlusal Fillings in Bicuspids and Molars.

The same arrangement of gold may be followed in building these fillings as for disto-occlusal surfaces, except that in mesial fillings mallet force is almost universally applicable. The better access to this kind of a cavity would seem to render these fillings more easily inserted than distal ones, but there is one counter difficulty which becomes important unless it is fully appreciated and the proper means taken to avoid it. This relates to the finishing of the filling along the cervical third of the approximal surface. As has already been stated, it is exceedingly difficult to manipulate a strip so as to cut against the mesial surfaces of these fillings. The ends of the strip cannot ordinarily be carried far enough back in the mouth to work effectively in the cutting of any great surplus of gold. The most that can be done is to smooth the filling after it is of the proper form.

It is therefore of the greatest importance that the filling when condensed shall present as nearly as possible the form it should assume when finished, and to this end a matrix should be used along the cervical third of the cavity to give the filling the most desirable form while it is being built. A little time and care in the proper adjustment of the matrix will be amply repaid in the facility with which such a filling may be finished. In those cases where it is found that an appreciable surplus of gold has been built over the cervical margin so that its removal with the strip would be found a tedious and ineffective process, or in the instance of a tooth with a concavity on the approximal surface of the neck, as in an upper bicuspid where the strip will not reach, the gold may be dressed to form with files or with keen-bladed trimmers. A suitable form of file for this purpose is found in the Rhein approximal trimmers, which will reach between the teeth into the concavity and readily reduce the surplus. The effectiveness of these files may be greatly increased if, following a suggestion of Dr. George H. Cushing, the blades are sharpened and cut with the same care that is bestowed on the blades of a bur. Prepared in this way they take hold of the gold with a definite grip and peel it off rapidly, leaving a smooth surface.

(To be continued.)

EUCAIN.

BY DR. W. D. MONROE, WASHINGTON, D. C.

(Read before the Union Meeting in Baltimore, June 4, 1898.)

Of the many conditions with which the dentist is daily brought in contact, nothing is more important than *pain;* and nothing more to the credit of the dentist or more satisfactory to the patient than the relief of pain.

In the pain produced in extracting teeth nothing is more potent than eucain as a local anesthetic. In the majority of cases nothing will be so satisfactory and efficient. With the immense advantages which accrued to dental surgery with the discovery of the anesthetic properties of cocain and its universal use, not only in special branches, but in surgery and general medicine, it would seem almost unnecessary to seek for other drugs with a similar effect; but the occasional alarming toxic effects which are obtained from the use of cocain are good reasons why the claims of any local anesthetic should be investigated, with the hope that chemical science may offer for our use as efficient a drug as cocain, and one without its dangers and oftentimes disastrous effects. Such a drug, it is claimed, was to be found in the synthetic compound known as eucain, which was offered to the profession a little over a year ago with a formula as unpronounceable as it is unintelligible, yet possessing marked anesthetic properties.

The advantages claimed for its use are, first, superiority in anesthetic property and extended duration of anesthesia; second, ability to be used without danger in large quantities, and with absence of any toxic effects upon heart or circulation.

Eucain is an artificial or chemical product. There is little chemical difference between eucain and cocain, the only important physiological and therapeutic action being the difference in their toxic effect. I have used as much as three syringefuls of an eight per cent. solution on one patient without any toxic symptoms, and no complaint expressed by the patient.

Another advantage which eucain possesses over cocain is the greater permanence of the solution. Cocain is decomposed by boiling, while eucain is not. Before a drug can make good its claim to being an ideal local anesthetic, it must fulfill three conditions: it must be the means of reducing the patient's pain to a minimum, of increasing the operator's facilities to a maximum, and it must cause no unpleasant effects during its application or afterward. And before condemning a drug as not fulfilling these conditions it is as well to take into consideration the method of application, the temperament of the patient, and the skill of the operator. Upon the method of application of the drug will largely depend the degree of anesthesia produced, and consequently the degree of comfort afforded to the patient and the facility to the operator.

Eucain has been described by some as not such a good anesthetic as cocain. It is possible that with experience we may incline to the view that proportionately as it is less toxic it is less powerful; but I have found it efficient, and, as this may be due to the method of application, it may not be amiss to enter into further detail on this point.

In the first place, the syringe must be in perfect condition. A fatal mistake is to attempt to inject with a leaking syringe; it is simply impossible to look for good results.

A good syringe to use is an all-metal syringe that may be thoroughly cleansed by boiling. The drug should be boiled immediately before using to insure the best results.

The needle may be inserted at any point the operator may desire along the root or roots of the tooth. Enough pressure must be brought against the syringe to cause a decided blanching of the gums in the immediate locality at least. Without this indication we cannot expect a painless operation.

If we be careful to not inject deep into the muscles we will not have any swelling after-effects, and it is usually carelessness that leads to this, and not the drug.

I think an eight per cent. solution is good for the extraction of teeth, and I advise eucain because it is rapid in its action, comparatively safe, produces positive and prolonged anesthesia, and causes no serious after-effects.

CATAPHORESIS.

BY HENRY W. GILLETT, D.M.D., NEWPORT, R. I.

(Read before the Union Meeting in Baltimore, June 4, 1898.)

THE title given me, "Is Cataphoresis of Benefit to the Profession—Why?" with the request for a three-minute paper, appears to imply on the part of the committee selecting it at least a doubt as to whether cataphoresis is of benefit to us.

This seems to me a decidedly novel proposition to come from a center of dental education, and a section of the country supplying so many shining examples of high professional attainment. If it is a benefit to the profession to have some of the difficult places made easier, then, surely, cataphoresis is a benefit.

There are so many reports in our journals of the successful use of the process in reducing the sensitiveness of dentin, that it will be a waste of time to review them or to report other cases.

It seems to me there is no one difficulty that the conscientious operator has had to contend with, so troublesome to overcome, as the extreme sensitiveness of the dentin presented by many of his patients. I say the conscientious operator, because it seems to me many of the other class are much less troubled in this way.

For those of the profession who have persuaded themselves or have been taught by certain "false prophets" that it is not necessary to thoroughly remove decay from cavities, sensitiveness of dentin presents a much smaller obstacle.

The man who is content, as many seem to be, to half clean the cavities presented, and plaster them up with cement, has much less need of any obtunding process.

Consequently, this portion of the profession is not much benefited by cataphoresis.

Those operators, also, who have made a reputation for rushing their work, and have, consequently, by natural selection gathered a clientele from those who prefer to be rushed, are not in a position to need or to appreciate any process requiring time to produce results. On the other hand, those who find it essential to a satisfactory practice of their profession to strive to attain the highest ratio of success possible, who endeavor to produce results that shall be lasting monuments of their conscientious following of their profession, realize that it is only by utilizing every possible aid that they can attain these results.

The fact that it is necessary to know something of electricity, and to study carefully the whole process in order to attain a satisfactory degree of success, prevents the extension of its benefits to some who otherwise would find it an aid.

Cataphoresis will probably never reach the stage where the "practical operator" can, by simply pressing the button, control all cases of sensitiveness in any given time. It may probably even continue as it now is, a process requiring too much time to make it a feasible one for use in *simple* cases.

The men who use it with satisfaction to-day are those who reserve it for the cases they cannot readily control in other ways. The time element is one of the more formidable objections.

To spend thirty or forty minutes, as is sometimes necessary, to get control of a cavity is a serious matter, but this expenditure of time in a case calling for extensive cutting is appreciated by many patients when they find that ten or fifteen minutes of painless work replaces the long-drawn-out agony of preparing a very sensitive cavity.

I had hoped that long before this the process might be much simplified and shortened, but I find my own tendency is toward longer applications in order that I may cut broadly in approximal cavities, and take away all tissue likely to decay later, this being rendered possible by the reduction of the sensitiveness by cataphoresis.

This broad cutting, so desirable for the protection of our work, is often out of the question without some means of control of the sensitiveness, and I know of no other means giving such absolute results as cataphoresis.

My final reply to the question is, that I *do* think cataphoresis a benefit to the profession, because it enables those members of the profession who have taken the trouble to fit themselves to use it intelligently to accomplish desirable results otherwise unattainable.

CORRESPONDENCE.

To the Editor of the Dental Cosmos:

Sir,—On page 611 of your June number E. Lawley York asserts, and not for the first time, that I have taught in my work on "Oral Pathology and Practice" that "the Delta organism of Miller is the one primarily concerned in caries of the teeth," and in apparent condemnation of me he has obtained from Miller the perfectly correct statement that he never said that any single organism was primarily the cause. I object to being placed in this attitude. I never represented Miller as saying anything of the kind. I instanced the Delta as one of an indefinite number of such organisms. The impression that I attribute, or believe that Miller attributes, caries to any single specific organism must have been obtained from a very superficial reading of what I have written. Such a hypothesis is an argument of straw very easy to be demolished. Very truly yours,

Buffalo, N. Y., June 10, 1899. W. C. Barrett.

PROCEEDINGS OF SOCIETIES.

NATIONAL DENTAL ASSOCIATION—SOUTHERN BRANCH.

First Day—*Morning Session.*

The Southern Branch of the National Dental Association commenced its second annual meeting, held in joint session with the Louisiana State Dental Society, in New Orleans, La., February 9, 1899. The meetings were held in the spacious quarters of the Fourth Battalion Louisiana State National Guard.

The meeting was called to order in joint session at 10.30 A.M.; the President, Dr. Wm. Ernest Walker, Pass Christian, Miss., in the chair.

Dr. Jules J. Sarrazin, president of the Louisiana Society, also occupied a chair on the platform.

Dr. Sarrazin introduced the venerable Presbyterian divine, Dr. B. M. Palmer, who invoked God's blessing upon the deliberations of the assembled bodies.

The Mayor of the city, Hon. W. C. Flower, was next introduced, and extended a cordial and hearty welcome to the associations.

Dr. Sarrazin tendered a graceful welcome on behalf of the

Louisiana State Dental Society, and in response Dr. R. K. Luckie, Holly Springs, Miss., delivered an eloquent and patriotic address on behalf of the Southern Branch.

Dr. Luckie's strength failed him before completing his address, and he was compelled to leave the hall.

The president, Dr. Wm. Ernest Walker, next delivered his annual address, which was referred to the following committee: Drs. A. R. Melendy, I. Simpson, and T. L. Westerfield.

Afternoon Session.

Called to order in joint session pursuant to adjournment; the president, Dr. Walker, in the chair; Dr. Sarrazin, president of the Louisiana Society, also occupying a seat on the platform.

The report of the chairman of Committee No. 6, Orthodontia and Oral Surgery, Geo. E. Hardy, M.D., D.D.S., Baltimore, Md., chairman, was, in the absence of Dr. Hardy, read by Dr. R. D. Seals, Fort Smith, Ark., as follows:

Mr. President and gentlemen, as chairman of your Committee on Orthodontia and Oral Surgery, we will in this report mention both subjects in a general way, and hope that these remarks will open a discussion that may lead to new thoughts and call forth some interesting ideas from members present.

Among the literature on the subject of orthodontia published this past year, Dr. Farrar's second volume of his great work is the most noteworthy. This is truly a masterpiece, and a fitting sequel to the first volume published some years ago. On these two books hang all the laws of regulating. They are the most comprehensive and complete treatise on orthodontia ever written, and show what a man may accomplish by applying himself to a specialty.

To make a success of this branch of dental science one must be a specialist. We should all have a general knowledge of the subject, and, in fact, should thoroughly understand the theory and practice of regulating, but the busy "general practitioner" of dentistry, if he has a good practice, is too busy a man to accomplish much in this line.

To take an impression, look over the models, turn them over with a few general directions to your assistant or mechanical man for him to devise, construct, and apply apparatus, is no way to regulate teeth. The doctor must give his undivided attention to the study of the models and of the patient. Not only decide what he wishes to do with the teeth, but what he has to contend with in the mechanical and anatomical surroundings, as well as in the peculiarities of the patient's disposition. He must control the patient as thoroughly as the appliance, and understand his character fully as well.

After the apparatus is constructed and applied, our troubles begin. "Eternal vigilance" is the price of success in regulating. Watch the appliance, watch the anchorage, watch the tooth to be moved, watch the tooth *not* to be moved, and watch the patient, to see that the whole appliance is not removed from the mouth as soon as he reaches home. To do this faithfully will consume a great deal of time, and, as I said above, this work should be in the hands of some one who is willing to give his whole life to it.

The most difficult kind of operation in my practice has been the one for retracting the six anterior teeth without tipping posterior teeth forward. After trying the Jackson method, the old rubber plate, the bands soldered together and cemented on, making posterior teeth practically a compound tooth, all with bad results, I have concluded that unless patient will consent to wear Angle's head-gear, to promise only bad results in such cases. It is very discouraging. Can any one here help us solve this problem?

Among the shorter articles published during the year the one by Dr. S. H. Guilford, of Philadelphia, in the Dental Cosmos for December, deserves special mention. He directs our attention to some of the fundamental principles involved in a most practical way.

The articles written by Dr. Kells, of this city, published and illustrated in the *Items*, are also very interesting and instructive. They show the adaptability and practical application of that greatest of wonders, the Roentgen rays, to this branch of dental science.

That the skiagraph is of inestimable value in certain cases is fully shown in these articles.

The "artistic treatment of natural teeth," as practiced by Dr. Younger, of Chicago, Dr. Payne, of New York, and others, is a move in the right direction. The results obtained by the artistic sculpturing, carving, and remodeling of badly formed teeth would astonish many of us here to-day. To be successful in this line of orthodontia we must, of course, be artists enough to take in the whole facial expression. Every feature must be studied and its relation to the proposed change of shape of teeth considered. I hope Dr. Younger, who I believe is with us, will give us the benefit of some of his experiences in this branch of orthodontia.

The subject of oral surgery is left so much in the hands of the general surgeon that we dental surgeons see comparatively little of it. This branch of our profession should be brought more prominently forward, and we should devote more attention and study to its advancement and practice.

Every person who holds the degree of "Doctor of Dental Surgery" should thoroughly understand at least the theory of oral surgery. He should pay especial attention to this branch while at college, should attend clinics and practical demonstrations on the diagnosis, treatment, and operation for every lesion of the hard or soft tissue of the oral cavity.

We should keep this subject alive, and inject it into our everyday practice by study of current literature, and especially by clinics, papers, and discussions at our usual society meetings. No association should consider its clinics complete unless it includes some operation in oral surgery. We are too prone to stay in the old rut, and have come to think all we have to expect at a dental association's clinic is to see some fellow cut away half a good tooth and build it up with glittering gold or glaring porcelain. We forget that the hare-lip of the same patient was sewed up by an

M.D., that the split palate was spliced by a general surgeon, or the small bony tumor removed by our friend, "the doctor." We are the proper and legitimate "doctors" to perform these operations, and there is no reason why we should take a back seat. Our education and manual training fit us pre-eminently for "oral surgeons," and I hope the time draws near when we shall be looked upon as such. In this connection Dr. Cowardin, of Richmond, promised to read a report of several surgical cases taken from office practice. I hope his example will lead others to relate their experience and express their opinion.

Discussion.

Dr. JULES J. SARRAZIN. Dr. Hardy having been delayed in the preparation of his report by sickness in his family, I have not had the opportunity of reading it, and am not, therefore, prepared to open the discussion along scientific lines. In listening to the reading I was struck by the absence of detail. This leaves but little opportunity for discussion. I can, therefore, only give the paper my indorsement on the general lines that it is always safe to follow.

Dr. F. HOLLAND, Atlanta, Ga. If the dentist of to-day is not to take more interest in surgical operations; if we are simply to continue to work along the same old lines, to travel in the same old rut, then I am not in order. It should be recognized that there is a large field to be developed. I believe that as between the M.D. and the D.D.S. the latter has the better opportunity for observation, and should be the one called upon in cases demanding surgical operation about the oral cavity. And every dentist should be prepared to respond to such calls without fear or hesitation. Of the fifteen or twenty cases of antral trouble treated within the year by surgical procedure (being a medical graduate, I am perhaps more fortunate than some in being called upon to treat such cases), I find that all those I have been able to follow up have had favorable results. I hope to see the day when we will no longer be classed as mechanics. We have only to live up to the proper standard to have our just claims recognized. We claim to be oral surgeons; let us operate as oral surgeons.

Dr. T. M. ALLEN. We have fallen into an obnoxious habit, in our discussions, of using the terms "doctor" and "dentist" when we mean "physician" and "dentist." We know that in our dental schools the dentist receives more of a medical education than the physician in the medical schools receives of a dental education. The properly educated dentist is the equal of the physician, so far as the field he occupies extends. Dentists are now recognized as the leading specialists in all that pertains to oral surgery.

Dr. H. J. MCKELLOPS. I have attended more association meetings, and have traveled more, perhaps, for the purpose of attending those meetings, than any one here present, and I want to say right now that medical schools do not recognize dentists as oral surgeons when they have only the dental degree; and how can it be otherwise when we recognize the fact, which cannot be denied, that dental diplomas and dental degrees are to be purchased by any one and every one who has a few dollars to put up. In some states dental practitioners are taxed annually on the same footing as the butcher and the baker. We must take some action in this matter.

Dr. L. G. NOEL. While we are discussing the report on orthodontia we would like to hear from Dr. Younger, who has had perhaps more success than any of us in the treatment of the class of irregularities defined in the paper. It has been said that unless the retaining bandage is worn a year at least, the teeth will drift back to the old position. We would like to hear from Dr. Younger on this question.

Dr. W. J. YOUNGER. I would prefer to demonstrate my methods rather than speak about them. My fingers talk better than my tongue.

With regard to my method of regulating with threads, I will say that they take up less room and work more rapidly than any metallic appliance that has been devised; that they are so easy in action that a child will tolerate them without a murmur; that by this method a tooth can be rotated upon its axis without disturbing the relations of the other teeth.

I also hope to show you what I mean by the artistic treatment of teeth, by process of which the appearance of the individual is improved, the teeth beautified, and their usefulness prolonged.

You will find that the enamel of the teeth in adult life has upon it the erosive impress of the acid saliva in which they have been bathed for years, and of the various acid medicines that have been used, especially in sore throat, diphtheria, etc., from childhood; and that it consequently presents an eroded, disintegrated, and more or less chalky and discolored surface. It is this chalky surface of enamel on the approximal parts that catches the acid mucus and retains food *débris* and bacteria of decay, which, by continually deepening the erosive effect, in time reaches the dentin, and decay is rapidly established. This deteriorated layer should be carefully and completely removed until the dense, clear, pure enamel is revealed. This enamel then, if thoroughly polished, will present a surface that will shed the acid mucus and decaying influences like a duck the water off its back, and will not only preserve the teeth from decay and prolong their existence, but by its brilliancy will add a charm to the face and a beauty to the smile that nothing else can give it.

The object of orthodontia should be not merely to get the teeth into symmetrical position, but to make the teeth themselves symmetrical, and, by removing this disintegrated layer and thoroughly polishing the true surface of enamel, protect the teeth from decay and prolong their usefulness.

I propose to give half a day to a presentation of my methods, which will, I think, be new to many of you, though some now present are familiar with them.

Dr. J. G. FIFE. I would like to hear from Dr. Younger about his methods in retracting the six anterior teeth. I have heard something of the wonderful results he has obtained, but I would like to know how he obtains such results.

Dr. P. J. FRIEDRICHS. The difficulty in attempting to retract the six anterior teeth is that the posterior teeth, used as anchorage, are liable to be drawn forward, but this will not be the case if the anterior teeth are carried back one at a time. If a bicuspid or a first molar is extracted to make space, one tooth at a time can be drawn back into the space made for it without moving the posterior teeth forward.

Dr. YOUNGER. In regard to retracting the six anterior teeth, I will say that in 1870, I think that was the year, General Ord, then commanding the Department of the Pacific, brought me his little daughter for the purpose of retracting the superior incisor teeth, which were protruding at an angle of about forty-five degrees. The permanent molars were not secure enough to offer sufficient resistance as anchorage. The child, who was under twelve years, had a very thick tress of hair, and, using that as a cushion, I invented an appliance which consisted of two strips of pasteboard about an inch and a half in width, one passing over and the other around the back of the head and united in front of the ears. From this point, on each side of the face, a band of rubber was stretched to grasp the end of a piece of wood about three inches long and a little thicker than a lead pencil. The center of this wood rested on the centrals—the two most projecting teeth—and was notched to receive their cutting-edges. The pressure brought to bear was such that in three weeks the deformity was entirely reduced and the teeth secured in artistic position. It is from this rude but thoroughly effective appliance that the C. C. Knowles, Goddard, and Angle, etc., appliances have sprung. Since then this has been my favorite means of reducing such deformities, especially in young persons.

Dr. H. W. MORGAN, Nashville, Tenn. One important factor that has not been mentioned, but which must be taken into consideration in the regulation of these cases and their subsequent retention in position, is the part played by the anterior lower teeth. Failure to give them due consideration is often the cause of failure to secure permanent good results. I have a case in mind in which the superior anterior teeth had been brought into position three times, but they went back because interfered with by the lower teeth. If entirely freed from occlusion with the inferior teeth, they will be more likely to stay where they are put. The lower incisors and cuspids will often have to be shortened, drawn back, or forced back into the alveolar process, or they may force the superior teeth forward again. No one should undertake the treatment of such a case until he has taken all these things into consideration. All fixtures should be *fixed*, and the teeth should be carried back as rapidly as possible. Unless the appliance is fixed it will not do the work adequately. It should be so arranged that the pressure will be constant.

Dr. A. R. MELENDY. In those cases where the cuspids are so hard to start it has been recommended that the process be cut away in advance of the tooth, so that it will not have so much resistance to overcome. In the first case in which I tried this method the pulp died; the second case was fairly successful, but the third was not sufficiently so to induce me to try it again. I would ask if others have tried this plan,—that of breaking up the process in advance of the tooth to be moved?

Dr. GEO. B. CLEMENT. In dealing with irregularities of the teeth we must take into consideration the character of the structure surrounding the teeth and the method of its formation. The proper thing to do is to start far enough back to *prevent* irregularities. Every child has twenty deciduous teeth. When these have erupted they, as a rule, occupy their normal positions without any irregularities. This process is completed at the age of four years at the latest. These teeth are subsequently shed, usually beginning at about the age of six and one-half or seven years, being preceded by the appearance of the first permanent molars. Our great object now should be to prevent irregularity of the permanent teeth, and the great point is to keep the first permanent molar back in its proper place, and to allow the permanent central incisors to occupy their permanent positions. To do this, take care of the intervening teeth, and keep them in place until nature removes them to make place for their successors. Watch them closely, and fill them if necessary, but do not allow them to be removed till their successors are ready to take their places. If this is successfully done, you will have no irregularities in the permanent teeth. I have been practicing twenty-three years, and I have always made it a rule to keep the first permanent molars in their proper place, and to preserve the space between the molars and the permanent incisors by caring for intervening teeth. I instruct patients as to what they are to expect in the mouths of their children, especially as to the appearance of the first molars, and have them bring the children to me for examination. It must be remembered that though the bicuspids occupy less space than the deciduous molars which they replace, yet that the permanent laterals and cuspids require more space than did their predecessors, and that if space is not jealously guarded for them then there will be crowding and protrusion or other irregularities. I advocate the prevention of the crowding of children's permanent teeth, and this can be accomplished by proper care at the right time. Of course, I am not speaking now of those cases in which heredity is a factor, though even that can be overcome.

Dr. H. H. JOHNSON. I would like to ask those gentlemen who have had great experience in these matters how long it is necessary that a retaining apparatus be worn to overcome that tendency to return to the original position. Of course there are cases where the opposing teeth hold them in their new position, but I refer to those other cases, in which there is nothing in the occlusion to retain them. How long must the retainer be worn?

As to cutting away the process, I have felt afraid of that operation. When the peridental membrane is destroyed—and I imagine it would be difficult to cut away the process without risking some accident—a slip of the instrument might destroy the usefulness of the tooth.

Dr. YOUNGER. You may put this down as a rule, that the harder the teeth are to move the more difficult they are to retain. If they move easily, a few weeks will sometimes be enough for the retention appliance. In other cases it may have to be worn a year or more. I had a case, a gentleman thirty years of age, whose left superior central was playing leap-frog with his right. After I had gotten it in position he wore a retainer three months. The first day after its removal the tooth started back. This tooth bothered me for nearly a year, but reflecting one day that the cause of this tooth's contumacy was due to the stretched tissue of attachment that would not loose its tonicity, I resolved to detach this central from the bulk of this dragging tissue, theorizing that it would then contract to its normal length, and, reattaching itself at the new point of contact, would itself hold the tooth in the position I should place it. So with a delicate bistoury pointed blade I severed the lateral attachments, being careful not to wound the cementum, pushing the blade in these parts as far as I could force it, then carrying the blade around the whole palatine surface, but not disturbing the central labial aspect, in order to prevent the possibility of the gum retracting in front and exposing the root. When I had finished I found my tooth quite limp and helpless, so, tying it in position, I waited for a couple of weeks. I found then that the tissues had reattached themselves at the new point of contact, and subsequently proved they were holding the tooth firmly in the new position, for it has never since then attempted to budge from its new location.

Dr. L. M. COWARDIN. As to a retaining apparatus for the six anterior teeth, there can be no rule as to how long it should be worn. You can only try removing it, and if the teeth start to go back put it on again and wait longer. It is very rarely safe to remove it in less than twelve months. Very often there exists a vicious habit of holding the tongue against or between the upper and lower teeth, which, if not discovered and overcome, may baffle our efforts.

Dr. WM. ERNEST WALKER. In a case which I corrected in the summer of 1888, and which, as it was between my college terms, I had to carry on as rapidly as possible, I moved back both the upper and lower anterior teeth in six months. I was, of course, obliged to carry back all the anterior teeth at once, as moving them one at a time could not have been accomplished within that limited time. I do not, however, approve of such rapid work under other circumstances. It was a case amounting to deformity, with marked impairment of speech, and one in which heredity had to be overcome, both the mother and grandmother of the patient having the same prognathic development. Back of that there was no history. The patient was probably twenty years old when she presented for treatment. Fortunately the patient had a very heavy suit of hair, and I used it as a pad for the neck, under a board which served as anchorage for moving back *en bloc* the entire anterior lower arch. I should have said that I first removed a bicuspid from each of the four quarters of the mouth. The retaining bandage was of the removable variety, and was advised to be worn for six months, but four times as long was eventually found to be necessary before the teeth would remain permanently in place. I may say that each arch was well developed in itself, and the teeth, which were unusually fine, were regular in the two arches, and the posterior occlusion was perfect, but the anterior portions were not in harmony with the face, the lips failing to cover the teeth except by special effort on the part of the patient. The results have been eminently satisfactory, as the patient is now a successful school-teacher, with noted ability as an elocutionist. Before the correction of the prognathic development, ordinary conversation required a painful effort, so much so that she avoided society. I now use the Jackson bandage with great satisfaction. By this system the teeth are moved gently and without inflammation. Patients prefer this method, as they can keep the teeth and bandage clean and lay it aside on special occasions. In the use of more forceful appliances, if they are temporarily removed, the teeth go back and the forming tissue is broken down and destroyed; but with the Jackson bandage the movement is so gradual that what is gained is retained. In cases of marked heredity, however, they may be moved, the teeth will tend to go back, and a retaining apparatus must be worn a long time.

Two or three summers ago I had a case in which I drew back the six upper anterior teeth. When the retaining bandage was removed I found that one of the laterals would go back, seeming to be pushed laterally, not forward. I examined carefully, to see if it were due to the occlusion, but there was no burnished place on a filling in the tooth such as would have been the case had the change been due to the impact of an opposing tooth in occlusion; nor could I, for over a year, get the patient, in my presence, to put her teeth in such a position as would cause the movement. I was on the verge of concluding that it was one of those rare cases of voluntary tooth-movement, a few of which have been reported. Finally, however, I succeeded in getting the jaw in the position in which biting caused a lower tooth to strike the lateral incisor and drive it laterally. I dressed down the offending tooth, and have not seen the case since.

The following paper was read by Jules J. Sarrazin, D.D.S., New Orleans, La.:

A Simplified Fracture Splint.

Some months ago a dentist of New Orleans called on me for consultation in a case of fracture of the lower maxilla. The case presented nothing abnormal, except that the patient was unruly and could not be induced to wear any form of bandage that would to any extent interfere with mastication or speech, or cause temporary disfigurement. Here in New Orleans we do occasionally encounter such patients, although they fortunately are exceptions; and, of course, we cannot always make successes of them. I fear that we did not at the time completely solve the problem, but it was nevertheless food for thought. I have never heard the outcome, and it is therefore easy to surmise.

The matter has since frequently recurred to my mind, and I have wondered whether, after all, patients were not somewhat justifiable. A review of fracture bandages discloses an array of splints which are all more or less uncomfortable and disfiguring while worn. In cases where there are teeth enough for attachment a bandage can be made which will allow perfect mastication, cause hardly any impediment to speech, and be apparent but very little indeed.

A couple of strongly rooted teeth on each section of fracture, or possibly one only, if it be a well-developed molar, will suffice for secure attachment.

The simplicity of the following will commend itself. We are dealing with a fracture of the lower maxilla, the most commonly occurring:

The first step is the making of a good model of the upper teeth. Next is needed an accurate model of the lower teeth. Little effort need be made to have the fracture in perfect position while the impression is taken for the latter, because breaking the lower cast at the place where the fracture exists in the natural jaw under treatment, and setting the pieces of the model to occlude with the upper teeth, just like close examination of the patient's teeth will suggest, will prove most satisfactory both in practice and in result. The case having been mounted on an articulator according to the above process, a simple lower splint is to be made, occluding perfectly with all the upper teeth, and extending one-eighth to three-sixteenths of an inch lower on the gums than the exposed necks of the teeth. This last detail has an importance which will become apparent later on.

The splint should not be very thick, and should include the last molars present. After polishing, it should be sawed through in such a way that, without weakening it greatly, it will require only little cutting with an engine bur to join the ends of the lines sawed through the rubber. The edges resting on the gums should be well rounded off, and of sufficient thickness not to wound.

Small drawn places between the teeth inside of the splint should be trimmed so that the natural teeth may readily slip in place therein.

While all this is being done the patient should be well fed, because nothing but liquids through a curved tube will be available for the next eight or ten hours.

A little yellow wax melted and dripped into the lines sawed through the splint complete the work preparatory to insertion. Now try in the mouth, and make sure that with the jaws closed and pressed together all parts will go in place nicely, and that the occlusion of the upper teeth and splint will be perfect.

Measure a sufficient length of linen or cotton duck, or some other material which will not stretch. Cut it from two and a half to three and one-half inches wide, as the case may require, and long enough to wrap eight or ten times around the head and closed jaw, cheeks, and ears of the patient.

So far we have proceeded leisurely, but now comes the critical moment, when quick and accurate handling will be needed.

The splint has been removed from the mouth, washed, and well dried. The bandage cloth is waiting in an accessible place; its seams strongly sewed, its whole length easily unrolled, and a few reliable safety pins with it.

On the mixing slab oxyphosphate powder and liquid are ready. Now stop and make sure that nothing will be wanting, that everything is reliably arranged. Then direct an assistant to hold the end of the cloth bandage, passing loosely under the jaw from behind the patient's head.

Have absorbents at hand to dry the lower teeth with. Now rapidly mix cement to a medium thick consistence, fill the inside of the splint with it, dry the lower jaw and teeth, and insert the splint while your assistant relinquishes hold on the cloth bandage, which you wrap strongly around the head, jaw, cheeks, and ears, after quickly bringing the splint and inclosed teeth to duly occlude with the upper jaw. Fasten the bandage securely with the safety pins, and dismiss the patient for a little longer time than the cement will require to harden.

If you are kind-hearted, make a present of a curved glass tube to feed and drink through meanwhile by inserting between the cheeks and teeth.

The patient may have been swallowing saliva while cement was mixed. A little moisture would not cause failure, but the nearest possible approach to dryness is desirable. The edges of the splint a little lower than the exposed necks of the teeth will have forced the cement well between the approximal surfaces of the teeth, making a secure fastening to the well-dried splint.

At the next sitting the cloth bandage may be removed, the excess of cement trimmed off, and the patient allowed to masticate henceforward on the rubber occlusal surface. Appearances will not be ungainly nor speech difficult.

When the case has healed the engine will easily join the ends of the lines sawed through the splint, which will then be peeled off in sections. The cement, which will not readily break off and force out from between teeth, may be treated with strong alkaline baths until it dissolves away. And this concludes the description of a fracture bandage, both simpler and more comfortable than those ordinarily in use.

Discussion.

Dr. P. J. FRIEDRICHS. I have been appointed to open the discussion of this paper, but I have had little experience in the treatment of fractures of the maxillæ. In twenty-five per cent. of the cases, however, I believe a very simple appliance, like this rubber splint, will be all that is required. Since I have seen this splint I have not had a case in which it might be used. The idea of using oxyphosphate cement as a fixative appears to me to be quite new. The only objection I see to the splint, theoretically, would be the difficulty of removing it; it has to be removed in sections and destroyed in the removal, while in case of severe inflammation it is sometimes necessary to remove the splint and replace it again. This splint would undoubtedly keep the parts in perfect apposition, and allow nature to do her work. The essayist says that he would feed the patient by means of a bent tube; but with a bandage put on as he has described, with nothing exposed except the nose and eyes, and especially unless the patient has lost some teeth, I cannot see how even a bent tube could be made available. It is true, however, that he provides for the removal of the bandage after the cement has set, when the excess of cement is to be trimmed off, and the patient allowed to masticate on the rubber occlusal surface. Theoretically, I indorse the splint, and hope he will soon have an opportunity to test its practicability.

Dr. WM. ERNEST WALKER. I have been trying to induce Dr. Sarrazin to exhibit the splint which he brought here for that purpose, but it appears that he carried it in his overcoat tail-pocket, and as he sat down upon it and broke it in three pieces he objects to showing it. Although so constructed as to resist the strain of the masseter muscles, in sitting down upon it it was in such a position that it broke along the lines which had been sawed partially through, to show the method of removal.

Dr. A. E. BLAKE, San Francisco, Cal. I have treated over one hundred and fifty cases of fractured jaws, and I do not consider this splint practicable, or that it would do to secure it in place with cement. The author would find that when the splint was removed there would be a space of half an inch between the jaws; there would be no occlusion. One speaker said that it was sometimes necessary to remove a splint in case of severe inflammation, but that is not so; the splint is always kept in position. The author can have no idea of the trouble there would be in the removal of a splint cemented to the teeth. A practicable splint would be one similar to that described in the paper, but having the occlusal surface filed off, so that the teeth would protrude and articulate. There is always more or less shrinkage and absorption of tissue under a splint, but if held in place with platinum wires they can be tightened from day to day.

Dr. SARRAZIN. I thought this splint might be new perhaps in some of its features, and presented it in order to learn whether it would appear practicable. As regards occlusion, mentioned by the last speaker, I have amply provided for that, as my models will show. I will not occupy your time further. I thank you for the kind reception given my paper.

(To be continued.)

DENTAL SOCIETY OF THE STATE OF NEW YORK.

THE annual meeting of the Dental Society of the State of New York was held in Albany, beginning May 10, 1899. Dr. R. OTTOLENGUI presented the following as the report of the correspondent:

INTERSTATE COMITY IN DENTAL LEGISLATION.

MR. PRESIDENT AND GENTLEMEN,—In seeking a subject about which to correspond with members of the profession, in order to obtain a basis for the usual correspondent's report, it has seemed to me that the one subject which at present interests the larger number of dentists throughout the country, and the one which is in most need of discussion and final settlement, is the question, "How best to unify the various state dental laws throughout the United States?"

The following is a copy of the letter which I sent to the secretaries of all the State Examining Boards in the country:

"*My dear Doctor,*—As correspondent of the New York State Society, it is my duty annually to present a report upon some feature of dental practice of vital interest to the whole profession. At the present time there seems nothing which will arouse more universal interest than a discussion of some method by which a uniform standard of education, or more especially of the granting of licenses, could be arranged throughout the states.

"I send you herewith a copy of *Items of Interest* for February, in which you will find a paper on the subject by Professor Kirk, and also a discussion. I would ask you also to read my editorial.

"Having done this, I would like you to send me, with permission to report it to my society, your own opinion, and, if possible, the opinion of your entire board, if it could be obtained at a meeting, as to the feasibility of either of the following methods:

"First, the one suggested in the editorial—That applicants for licenses should be required to present the papers upon which they were examined at college when obtaining their diplomas. The State Board, upon being satisfied through these original examination papers that the applicant is worthy, to give him a license to practice; and, secondly, to accept a license of this character granted in similar manner by any other state.

"Second Proposition—For all State Boards, members of the National Association of Dental Examiners, to make use of identical examination papers, the same being prepared by a committee of the national body; licenses granted upon such examination papers to be interchangeable among the states represented in the National Association.

"Is it not a fact that without appealing to the legislature of your state, your body is privileged to consider either of the above methods a satisfactory examination of the candidate? That is to say, is not the examination left to the determination of your board? In which case you will be at liberty to carry out either of the above propositions.

"Lastly, in case neither of these would seem practical in your state, have you any alternate proposition whereby it would seem feasible, within an early period, to attain interchange of licenses between states?"

The replies received to date are as follows:

District of Columbia.

"I have to state that, under the existing dental law of the District of Columbia, the Board of Dental Examiners is required to grant licenses to all graduates of all dental colleges which give a three-year course of study, and to examine all other applicants, to test their qualification, both in theory and practice of dentistry before granting license. We have a new bill before Congress, and, if enacted, the board will have more latitude than it now has, especially in respect to interchange of licenses between states.

"In expressing my personal opinion upon the subject matter, will state that I fully indorse the suggestions made in your editorial, believing them a proper solution of the question. C. W. APPLER, *President.*

"WASHINGTON, D. C."

New Jersey.

"It is with the greatest pleasure that I accept your courteous invitation to give my views on Professor Kirk's paper and the ideas advanced by yourself in the discussion of the same, and in your editorial in the February *Items of Interest.*

"This subject has been one of grave consideration to me for a number of years, and I must allow that there are many alluring thoughts in both of the plans suggested, but, unfortunately, I cannot but see the other side of the picture.

"As to the first suggestion, it would have to be made absolutely sure that in no case could there be connivance between the college and the pupil. There may be dishonest colleges, another writer in the same issue of the *Items of Interest* suggests that there are, and that by the means you propose they will be forced to raise their standard. Admitting simply for the sake of argument that there may be some such dishonest colleges, what is the guarantee of the genuineness or originality of the answers to the college questions? If a professor in a college would offer to sell to a student up for graduation the questions and answers of a State Board before whom he had to appear, might he not be willing to dispose of the answers to his own questions for the benefit of his own school, if he thought its reputation in danger? And after all, would this method be as thorough an 'examination of the college' as by the present means? What is the difference whether the applicant is rejected on the college questions or the board questions? Does it not reflect upon the institution in practically the same way?

"As to the second suggestion, it is, in my opinion, theoretically most excellent, but practically impossible, as I do not believe that any means could be devised to prevent the questions from becoming marketable before some of the state examinations, owing to the differences in the dates of the college commencements, as well as the meetings of the State Boards.

"Under the laws of New Jersey the manner of examining is left to the board, so that in answer to your question on this subject I would say if our board considered either of these suggestions practical, they could adopt it.

"As to the lastly, of course we all have our ideas of Utopia, but then along comes the other fellow to show they are not practical. I have my ideas on this subject; I have talked them and written them for years. In the first place, strange as it may sound, I am opposed to examining boards,—not to the boards themselves, understand, but the conditions which made such an imposition necessary. When a graduate receives his diploma, he should receive with it the right to practice anywhere under the Stars and Stripes, without let or hindrance from any one.

"How can this be accomplished? Let the final examinations for graduation in all colleges be conducted by a National Board of Examiners, appointed by the government of the United States. A diploma issued under these circumstances would be universally received and the necessity of State Boards abolished. This may be a long way off, but, in my opinion, it is the only safe and practical solution of the problem, and with a combined effort from the profession, colleges, and State Boards, backed by the National Associations, I believe it will succeed.

"G. Carleton Brown, *Secretary.*

"Elizabeth, N. J."

Wisconsin.

"I have read Dr. Kirk's paper, also discussions, together with your editorial, very carefully, and must say the more I read them the more confused I become in regard to this burning question. It is a question to which I have given much study and thought, and yet cannot say that I have arrived at any definite conclusion.

"This board is a member of the National Association of Dental Examiners, and as such is in full sympathy with its work—that of raising the preliminary standard of colleges. To my mind that is the most important question at this moment. What dentistry needs to-day, above all things, is an educated body of men, and this can only be accomplished by insisting upon the colleges admitting only educated men. This they must do. The time has arrived for it. If they do not acquiesce willingly, then they must be either forced into line or else come to grief. This is the work of the National Association, and this is the issue it is pushing with all its might and main. This board has taken a firm stand along this line, and is not recognizing diplomas from any college not on the recommended list. It has a bitter fight on its hands, but it is going to win. The National Association having accomplished this, it will then, doubtless, take hold of the question of a 'uniform standard of granting licenses throughout the states.'

"As our law requires us to grant licenses to all reputable graduates, we would not give you any suggestions as to the best manner of solving this question, so far as experience is concerned. I must say, however, that your idea is worthy of much consideration, and I believe comes as near solving the question as any that has thus far been offered, although I most certainly dissent from your opinion as to 'State Boards being a necessary evil.'

W. H. Carson, *Secretary.*

"Milwaukee, Wis."

Maryland.

"As there is considerable diversity of opinion as to the feasibility of the suggestions in your communication, I am authorized to use my own discretion in answering.

"Your first suggestion is not perfectly clear to me. If you mean that a list of the questions used at the college examinations be submitted to the board, that could give us no idea of an applicant's status, and I am sure the college faculties would not allow inspection of answers.

"The second suggestion, to have identical examination papers, would necessitate the holding of simultaneous examinations by the different State Boards. If one board meets for examination one week, and another board meets the following week, applicants might be enabled in some way to obtain a list of the questions.

"Our law allows us considerable latitude, and any of the suggestions could be adopted, if feasible.

"I am very sorry that we cannot give this matter more attention, but I assure you that our board is in entire sympathy with any project that will elevate the standard of dentistry.

J. G. Heuisler, *Secretary.*

"Baltimore, Md."

Pennsylvania.

"It was impossible, after your letter came into my hands, to get our board together in time to obtain an expression of the body. To myself, personally, either of the two propositions would be satisfactory, except that the first would, I fear, remove the test very little away from the faculties of instruction. This you may deem an uncharitable view to take of it, but so long as men's wings have not sprouted, safeguards appear necessary.

"The use of identical questions, if feasible, would, to my mind, appear the most impartial. It would involve simultaneous examinations in all the states, just as two weeks ago, we, in this state, held such in three separate places.

"As I interpret our law, there would be no necessity for further legislation for the adoption of either proposition in our state.

"H. Gerhart, *Secretary.*

"Lewisburg, Pa."

Illinois.

"I am not in position to express the sentiments of the board at this time, as our next board meeting will convene on May 13.

"To express an individual opinion at this time will say that considerable opportunity is afforded for discussion on either of the propositions presented. Both of the methods seem to have merit, and no doubt can be discussed at the National meeting.

J. H. Smyser, *Secretary.*

"Chicago, Ill."

South Carolina.

"In reply to your communication will say that our board does not meet again before the second Tuesday in July, and of course I can get no opinion of the board.

"Being a subscriber to *Items of Interest*, and holding the position I do on our board, of course I had already read carefully the articles referred to.

"I would not object to your first suggestion, and do think, if carried out honestly, it would answer every purpose, but care should be taken that such papers be not tampered with by any one.

"I have no objection to the second proposition, if the same care be taken to keep the questions well guarded by those who have the right to handle them.

"It is a fact, according to my understanding, that our board has discretionary power about examination, and could carry out the above propositions, if so desired.

"You will notice that I seem particular about who should handle questions and examination papers. I have served on our State Board over ten years now, and have some experience about stolen questions and other underhand methods about examinations. Our board is composed of graduates and has the reputation of being very strict, which may be the cause of my experience, and few members of the profession would believe the tricks employed by some to pass the examinations. Then, again, if some of the questions and answers I have seen in print are samples of the examination papers where some of the colleges grant degrees, I should not like to trust those same professors too far. So I say, if honestly carried out, your plan would be very well, but unless all parties who handle the papers can be trusted fully, we may better stick to the old way. J. R. THOMPSON, *Secretary.*

"NEWBERRY, S. C."

Indiana.

"As our board has not had a session since receiving your communication, what I have to say in reply represents my own ideas. But I know that these are shared in part by some of the other members of the board.

"Your first suggestion relative to applicants obtaining licenses upon the papers upon which their diplomas were granted is, I consider, a good one. At any rate it would afford a board a better opportunity of knowing more of the qualifications of the applicant. To this, however, should be added a requirement of two days' practical work at the chair, and a license granted to applicant based on his standing in these. If the standing of State Dental Boards were uniform throughout the Union, then a license granted in our state should be respected in each and every state in the country. But such is not the case, for various reasons (in part, political) which cannot be discussed here. Even in a single state, the competency of the various boards that come into power in a given number of years fluctuates.

"Second suggestion of State Boards using identical examination questions prepared by a committee of the National Association of Dental Examiners, is a good suggestion also, provided that Examining Boards meet at one and the same time throughout the country. This contemplates, of course, examining the product of our colleges. All this being equal, the better the material going into these institutions, the better the product.

"If such a thing as having all dental colleges equally competent to give instruction to their students were possible, then the quality of the material entering into those institutions would alone need to be considered, and to a large extent we would be satisfied with the general output. But different motives govern different colleges. The same to a little less extent we find true with State Dental Boards.

"It has been suggested that the Dental Boards allow the colleges to accept any and all applicants and graduate whom they choose. That all State Boards examine all applicants for dental licenses with questions prepared by a committee of the National Association of Dental Examiners. That the answers be sent from each state (members of the N. A. D. E.) to the committee having prepared the questions, they to examine and grade them, and on the committee's markings the State Board to either refuse or grant registrative certificate or license.

"Our last state legislature passed laws giving the board greater power, and enables us to examine any or all applicants for license. I will send you a copy of the laws. M. A. MASON, *Secretary.*

"FT. WAYNE, IND."

Louisiana.

"Your first proposition about the granting of licenses to an applicant upon his original college examination papers seems to me to be a very fair and just one, provided the said papers could be had direct from the colleges in an untampered condition.

"Your second proposition meets with my hearty approval, and I hope soon to see the day when such a rule will be in force.

"Third, yes.

C. V. Vignes, *Secretary.*

"New Orleans, La."

Maine.

"In regard to your inquiries concerning the granting and interchange of licenses, etc., I reply briefly as follows:

"Our board are unanimous in the opinion that some change is desirable, but they are not unanimous as to the practicability of any plan. We have had no meeting, but I have obtained an expression from all our members except one, and the second proposition, as stated in your letter, is regarded with favor, but one is not prepared to favor interchange of certificates.

"I believe that it is the privilege of the board to consider and adopt any of the propositions given.

"I have not at present any proposition to make.

"D. W. Fellows, *Secretary.*

"Portland, Me."

New Mexico.

"Your first proposition, if adopted as a whole, would defeat the very object for which it is proposed. Without going into the merits of the first clause, and admitting the desirability of its intent, it would be null and void if the second clause was adopted, for this reason. Immediately upon the graduation of a student he would present his papers to the local board, receive his license, and the same would be accepted by all other boards as satisfactory.

"In place of this proposition, it seems to us that the plan adopted by the National Association of Dental Examiners is far preferable. Let each State Board have jurisdiction over the local colleges, enforce rules similar to those insisted upon by the National Association, seek means to compel their observance, and when the school comes up to the standard thus established, let all other boards accept the diploma as fully meeting their requirements, and issue a license without further delay.

"This rule of the National Association is strictly enforced by this board, which is given such power by our law, and is found in practice to be equitable and just. We have had numerous applications from graduates of colleges not recognized by the National Association, who, when notified that we could not give them a license under our law, have quietly departed without further trouble. The board and the profession generally are much gratified at this provision of our law.

"We are, therefore, of the opinion that proposition No. 1 is not feasible.

"The second proposition meets with our hearty commendation. We will be glad to see such a provision adopted.

"It is a fact that, without appeal to the legislature of our territory, either of the methods would be considered a satisfactory examination. The examination is left entirely to the discretion of the board.

"The suggestion given above seems to us, after six years' practical experience, to be nearer our ideas in regard to the interchange of licenses between the states than any method yet proposed.

"D. W. Manley, *Secretary.*

"Santa Fe, New Mexico."

Kentucky.

"In regard to dental legislation, it seems to me that some of us have never comprehended that dental laws are police regulations, intended for the protection of the people, and for that alone.

"The state cares nothing about protecting dentists from competition, but it cares a great deal about protecting the public from incompetent dentists. Nor does the state care where or how a dentist gets his education, provided only that he has sufficient training not to prove dangerous to the community. Accordingly, in Kentucky, the legislature has constructed the State Board of Dental Examiners, solely for the purpose of protecting the citizens against incompetent dentists.

"The law provides that no one shall practice dentistry in this state without a certificate of qualification from said board, and that the evidence by which he may establish that he possesses sufficient learning and skill to entitle him to a certificate shall be either such a diploma as proves the possession of the necessary attainments, or in the absence of such a diploma, the standing of an examination by the applicant by which he gives evidence of this fitness.

"In a word, no one can practice without a certificate from the board, and this can be secured by means of a diploma or an examination, and in no other way.

"The board deals wholly with individuals, and passes on the qualification of each individual applicant, as evidenced by his diploma or examination.

"The board owes no duties to any college, as a college; though, if the college maintains a standard of sufficient grade, its graduates are entitled to certificates upon presenting and filing their diplomas; but this is true, because, and only because, the diplomas taken as evidence satisfy the board that the parties holding them possess such knowledge and skill that they can safely be turned loose on the public.

"The board has no authority to require the applicant to produce his examination papers, and no right to issue any certificate on them; nor has the board any right to recognize 'licenses' granted by other states. Of course, a law might be passed authorizing the Kentucky Board to recognize licenses granted by other states, but the board should not do so without such a law.

"The prevailing notion that dental legislation is enacted, first, for the protection of the dentist from competition, and, second, for the protection and benefit of the colleges, seems to me to be fraught with great danger to the cause of dental education. The protection of the people from incompetency is, and ought to be, the only ground on which such legislation can be maintained.

"The great trouble in enacting satisfactory dental laws is the fact that a large majority of the people, both in and out of the calling, have no just conception of the scope of such laws.

"We need education along these lines.

"Of course, if a uniform law could be passed by all of the states, it would be very desirable; but when we think of the difficulties in the way, it is an undertaking from which we may well shrink. We would first have to agree on what ideal law was, and then have it passed by all of the states exactly as agreed upon.

"To any one who has had experience in trying to influence legislation, this proposition is absurd; the whole plan, to my mind, is simply impossible of accomplishment.

"As to the proposition to have a National law regulating the whole matter, the advocates of such a plan evidently have no appreciation of the basis on which this government is formed. As mentioned in another part of this letter, all laws concerning the health of the people of the states come under the head of 'police regulations;' these regulations begin and end with the state and cannot be made a matter of National law.

"J. H. Baldwin, *Secretary.*

"Louisville, Ky."

Vermont.

"The idea of having an applicant for a license to practice dentistry in any state present the examination papers upon which he was examined in college, is a good one; still this has its drawbacks, for it is a fact that quite a number of students are graduated each year, and from our best colleges, who are not qualified to practice dentistry. Where there are so many students, it is impossible for the college instructors to watch every student while doing the work required of him. For instance, a student (who has been a laboratory worker for several years) told me that during the past winter he earned enough to pay nearly half of his expenses, helping fellow students do their depositing and practical cases required by the college. In mentioning this, I do not intend it as an attack on the colleges; far from that, but to show that some students manage to evade the requirements of the colleges.

"Second—I cannot favor the idea of having an identical list of questions gotten up by a committee of any association, for the reason that the various State Boards hold their examinations at different times. An applicant might be refused a license in one state, and being familiar with the list of questions, could go to another state and pass the examination. I would favor such a committee making up examination papers that would be uniform, but different questions for each state. Here, in New England, we have an Association of Dental Examiners, and we are trying to make our examinations uniform and to get uniform laws, that we may accept licenses from other states in place of an examination. I would like to see this done by all the states in the Union.

"Our law says, 'shall at its meetings, examine applicants, etc.' If a license is given without examination we are discriminating. Law does not allow any one to discriminate. When the time comes for the recognition of licenses from other states, an amendment to the law, giving the board authority to accept a license from another state in place of examination, can be easily obtained.

"I hail the time when all states shall have such uniform laws and examinations, that the interchange of licenses may be brought about without doing an injustice to any one—colleges, examining boards, practitioners, or patients. GEORGE F. CHENEY, *Secretary.*

"ST. JOHNSBURY, VT."

Virginia.

"In regard to your first proposition, I believe that such a method of examining candidates for state license would tend to encourage some colleges to fraudulent acts, and would tie the hands of the examiners, so that it would be impossible to stop it. I do not mean to say that all, or even a large per cent. of the colleges would take undue advantage of the examiners, but if even one did, that would be argument enough against the plans. This proposition carried to its last analysis is the same thing as registering diplomas straight out; the only difference is that one method has 'red tape,' and the other has not.

"Your second proposition is a good one, but at this time I do not think it could be put into practice without arousing political influences that would in some cases injure the usefulness of the board for years, and delay the interchange in licenses for some time to come. If this plan of examining candidates could be put in practice, we would not be far from interchange of licenses.

"There is nothing in the Virginia law that would prevent a Board of Examiners from accepting either of the propositions mentioned.

"I regret I cannot offer an alternate proposition to obtain interchange of licenses between states. An unrestricted interchange of licenses between states, in my opinion, would not be desirable. An interchange whereby worthy and competent men could practice anywhere in the United States is desirable, and I would be glad to see the consummation of the plan by which this could be brought about. It will require time, careful thought, and considerable work to perfect a plan whereby justice can be done in the matter of interchange of licenses between states. Any plan should be thoroughly safeguarded against incompetent men.

"H. W. CAMPBELL, *Secretary.*

"SUFFOLK, VA."

Massachusetts.

"Personally, I have been pleased to read the advice, opinions, and suggestions in the journal at your request. At present, I could not indorse either of the propositions contained in your letter, as being at all feasible and practical.

"Our board has long been interested in this matter, but realize that the attainment of even a portion of what is desired will require a long time—legislative changes are not easily obtained everywhere; then we would not think it possible that the dental schools would consent to have their examination papers taken all about the country to be examined by a State Board at any and all times whenever a man desired to locate in its territory. Do not also think it feasible, for a time, to have the examinations throughout the country on the same day, and the issuing of questions left to the National Association of Dental Examiners.

"Our board, two years ago, organized with the other New England Boards an association for the purposes under discussion; have held profitable meetings, and attained as much, I think, as we could in our work here. I think it is in evidence we cannot attain the objects the two propositions aim at, only in a comparatively slow manner. It will require a long time. The schools must be of even excellence, the Boards of Examiners must have the same standard, provision must be provided to examine a candidate even if he has not attended a dental school, but I will not dwell longer upon my personal views. G. E. MITCHELL, *Secretary*.

"HAVERHILL, MASS."

"It is the unanimous opinion of the Massachusetts Board of Dental Examiners that your first suggestion is impossible, for the reason that our twelve years' experience as an examining board has taught us that many of the young men who appear before us, recent graduates from reputable colleges, have utterly failed to pass our examinations, and are, in our opinion, incompetent to practice dentistry.

"Your second proposition also seems to us very impracticable. It would necessitate examinations being held everywhere on the same day, which is not feasible, and would allow too much concentration of power in a few individuals.

"Our New England Association of Dental Examiners was organized with a view to bringing about in New England what seems to us the only practical way to interchange certificates, namely, a uniformity of legislation and of uniform standard of qualification. Though we have been in existence but two years, I feel we have made respectable progress; already two laws have been changed to harmonize with Massachusetts, and when those who are a little lax come into line, we hope to form a perfect law for New England.

"J. F. DOWSLEY, *President*.

"BOSTON, MASS."

New York.

"Without going into discussion I would say, in regard to your first proposition, if all men were honest, if all were half as anxious to elevate the profession as they are to fill their pockets, this plan offers great inducements; but so long as the ungodly are in power, so long as colleges are run on a money-making basis, so long as there is a handsome surplus to divide among the favored few each year, I fear that plan would not be reliable.

"Second Proposition—The first thing should be a uniform standard for matriculation, and this should not be a farce, but should be placed high enough, so that our eyes and ears will not be constantly shocked by bad chirography and worse grammar. If you could sit with an examining board for one session, and see the time consumed by trying to read writing that would make a Chinaman turn green with envy, grammar that is execrable, and spelling that gave you 'bad spells,' you would think and say at once, 'For Heaven's sake, make the standard high enough that the people be not shocked by such display of ignorance.'

"This may seem overdrawn, but quite a percentage of that class come up every year, and it is needless to say they do not favor raising the standard.

"For our state, we have settled upon a full high school course, as a prerequisite for matriculation. This insures a fair English education. Let the other states adopt the same standard, or one equally as good, and we are all on a par to start with.

"Then let a committee be appointed by the National Association, National Board of Examiners, State societies, or by such power as may be deemed best, to formulate questions for examination. Let all State Boards adopt these questions and we have a uniform examination throughout the states, and a license in one state would be equally good in another. Of course, the applicant must have taken his degree in regular form.

"I think the New York State Board of Dental Examiners, in connection with the Regents of the University, have full power without further legislation to adopt any method of examination which may be deemed best for the elevation of the dental profession. FRANK FRENCH, *Secretary*.

"ROCHESTER, N. Y."

West Virginia.

"None of the members of the board seemed to altogether approve of either the first or second proposition. There is such a different standard of qualification in different sections of the country, that it is very difficult to fix one to suit all. What might suit the standard of West Virginia might be very far from the standard of New York or Boston. Colleges in different parts of the country are turning out handsomely finished, full fledged, first-class dentists by the hundred—yes, by the thousands—with beautifully finished diplomas, on which very few are able to read anything except their own names. Many of them are as well qualified to practice dentistry as a hog to teach Latin. Some are bright boys, and, probably, good mechanics, so after some practice and experience may make good mechanical dentists.

"We think as a board, we have the right to determine the qualification, and decide the question whether or not the candidates are qualified and fit to practice dentistry in our section of the country. A Board of Dental Examiners in Boston, and possibly New York, might give their noses a celestial turn if a West Virginia Board should attempt to dictate to them what sort of an examination they should give their candidates.

"It certainly would be a great convenience if some universal law could be made, that would suit all the different states.

"I have not gray matter enough to work out so important a question. It is a problem requiring the head of an experienced legislator.

"We think we are all practical sort of men, and would be pleased to vote for anything that seems feasible, and would be glad to have some universal law that would make one examination do for all the different states.

"CHAS. H. BARTLETT, *President.*

"PARKERSBURG, W. VA."

North Carolina.

"I am convinced that we need a uniform standard of education. Either of your plans would accomplish the purpose, but my preference would be for the second proposition.

"I think that under the law of this state, the examination is left to the determination of our board, and we would be at liberty to carry out either of the propositions. R. H. JONES, *Secretary.*

"WINSTON, N. C."

Florida.

"I am of the opinion that the second proposition suggested is the more desirable. I think it should not be limited, though, to boards which are members of the National Association. I do not believe in making it compulsory for boards of separate states to join the association. Think it is a step in the right direction. R. A. SHINE, *Secretary.*

"TALLAHASSEE, FLA."

North Dakota.

"In regard to the proposition that State Boards should issue a license upon presentation of the diploma and the original college examination papers as guarantee of the knowledge of the applicant for examination, I would say that it seems to me that this is almost an impossibility, and, in fact, would be so in many cases, especially the men who are now graduates and who cannot obtain papers written by them when in college, and even if they could secure their old individual examination papers, it is a question whether they would be of such character as to meet with the approval of the State Boards at the present time.

"The suggestion that the State Boards agree to a definite examination by questions issued by a committee of the National Board of Dental Examiners, I think is the only fair solution of the question—with this proviso; that where it is possible, the State Boards agree to the same date for the examination in the different states, say during January and July of each year, and within, if possible, the same week of these months, at which time all applicants for examination should be given the questions as issued from a committee of the National Board of Dental Examiners. These questions to be furnished to the State Boards in such manner that no knowledge of them could be obtained by any person or persons who are to be examined. Papers written by parties examined under these conditions to become a part of the evidence of their ability as dental practitioners. These papers with a license from any State Board, issued under the above conditions, to be accepted by all other State Boards agreeing or being parties to this agreement. This arrangement would allow the practitioner to take the State Board examinations at any of these semi-annual meetings, and after having once passed any State Board on the National Board of Dental Examiners' questions, he would be eligible for license in any other state agreeing to this arrangement, no matter at what time he might desire to change his residence.

"I think the greater part of the State Boards who are members of the National Board of Dental Examiners would permit of this arrangement, and to so change the date of their meetings by which we could have a uniform date, say the second week in July and January, at which time all State Boards would hold a meeting, and each and every applicant for license would be compelled to have the same examination, thereby showing no favoritism of politics to any candidate.

"It is almost impossible for State Boards to agree to accept the diplomas without question, from any college. Mistakes will happen, and men go through by some method or other, who are thoroughly unfit to practice dentistry or anything else.

"The North Dakota Board finds the only successful rule, 'To examine all candidates without discrimination as to college or other conditions.' After some eight or ten years' knowledge of the board's workings, I believe that this is the only one fair method at arriving at the definite understanding of the knowledge of the applicant for license. In fact, we have had to turn down men from some of the best colleges, while others from colleges of less note have proven in every way, so far as examination would demonstrate, much better prepared for practice. H. L. STARLING, *Secretary.*

"FARGO, N. D."

Washington.

"Our board has had no meeting recently, and I cannot therefore send you the opinion of this board regarding interchangeable licenses. My own judgment is that the second proposition would come nearest to being practical in its workings. Our law defines thirteen branches, including practical demonstration of ability, that the applicant must pass in.

"If these were covered by an examination in another state, it might be legal to consider this a satisfactory examination, but of course this is a point purely to be decided by the board. W. E. BURKHART, *Secretary.*

"TACOMA, WASH."

Utah.

"In regard to suggestion No. 1, the idea of having applicants present to State Boards their original papers upon which they were examined is to me commendable, in so far that it assists the Dental Board, but the granting of a license upon said papers and the interchange of licenses granted upon such evidence of ability would never meet with my approval.

"Suggestion No. 2—State Board making use of identical examination papers; this is commendable, provided, however, they be the original papers and not made interchangeable; your method, however, would meet with no opposition from our legislative body, because our laws are founded upon findings from the National Association of Dental Examiners.

"I have no propositions to make in regard to making licenses interchangeable, for it will certainly meet with opposition here.

"GEO. E. ELLERBECK, *Secretary.*

"SALT LAKE CITY, UTAH."

Thus, gentlemen, we have before us in concrete form an expression of opinion from twenty-one Examining Boards, a summary of which brings out some very important facts, not the least of which is the fear that dishonesty would militate against any proposition. Five states, apparently speaking from experience, suggest that dishonesty is traceable to the colleges direct, while some believe that the greatest care is requisite to prevent fraudulent possession of examination questions by applicants for license. If these accusations are well founded, it is a serious blot upon the honor of those in charge of our educational system. Further consideration of this feature is not requisite here, as we are merely seeking to achieve interchange of license, and if there be dishonesty, licenses should not be procurable even in one state.

To those who have believed that an interchange of license is a dream of Utopia, the present series of letters must prove as encouraging as they will be surprising. Two propositions were considered. The first provides that the candidate shall present his college examination papers which shall entitle him to a license, if satisfactory to the Examining Board. To this proposition four states assent, viz, District of Columbia, South Carolina, Indiana, and Louisiana, while five others approve the scheme while doubting its possible enactment. These are Wisconsin, Pennsylvania, Illinois, Vermont, and North Carolina. Maine, Washington, and Florida merely express a preference for the alternate proposition, so that their vote is neither for nor against. Nine states, however, oppose the idea, these being New Jersey, New Mexico, Kentucky, Virginia, Massachusetts, New York, West Virginia, North Dakota, and Utah.

There being nine states that oppose the proposition, and only nine in favor of it, the majority of which latter are doubtful, we may dismiss the idea as untenable, especially as its perfect operation would require the co-operation of the colleges, which could be procured, but only by force. Many of the objections which have been made can be answered, several being due to misapprehension of the scheme, but as we abandon the idea it is futile to waste time in further discussion.

The second proposition has met with such a reception that it merits our most studious and earnest consideration. Fourteen states approve the plan, only three being opposed. Of the others, two failed to approve merely because they preferred the first proposition; they would certainly accede to the second. Another, New Jersey, thinks the scheme excellent, but impracticable, while a fourth, Vermont, opposes only the feature of identical questions, and suggests a modification which could well be adopted. Thus three states oppose, Kentucky, Massachusetts, and West Virginia, while seventeen indorse the idea, these being District of Columbia, New Jersey, Wisconsin, Pennsylvania, Illinois, South Carolina, Indiana, Louisiana, New Mexico, Virginia, Vermont, New York, North Carolina, Florida, Washington, North Dakota, and Utah.

The next matter of moment is the third question, whether the Examining Boards being willing to adopt the plan, have they the legal power? Every state admits that such power exists without further legislation, except Kentucky and Vermont, but we are informed that in Vermont an amendment permitting interchange of license on an equable basis could be obtained.

The greatest difficulty in connection with all schemes heretofore proposed has been the impossibility of obtaining further legislation throughout the states. I am exceedingly proud to have evolved a method agreeable to the examiners of seventeen states, which can be put into operation without special legislation; a plan therefore within the scope of existing laws, and for that reason, worthy, I think, of adoption and trial for a time at least.

Certain objections have been brought out, but these can certainly be met. The greatest trouble seems to be that in order to avoid dishonesty it would be requisite that the examinations should be held simultaneously. One correspondent says this is impossible, but he does not explain why. So far as the examiners are concerned, they certainly should be able to adopt any date agreeable to the majority of those coming into the agreement. The only difficulty which occurs to myself seems to be that students of some colleges would be compelled to lose some months perhaps after graduation before license could be obtained. But this only adds a brief period to their studentship at worst, and if this were thought to be inequitable such graduates might be permitted to practice undisturbed until the date of the first examination after their graduation. If the examinations were held semi-annually, this would be but a comparatively brief period.

The correspondent from Vermont objects to identical examination questions for all states, and suggests a single committee authorized to arrange the questions, but having power to promulgate separate questions for different states.

After due consideration of all the letters received I have the honor to suggest the following, as a solution of the vexed problem:

First—That a single National Committee shall arrange the examination questions for use by the State Examining Boards, and that license granted by one state, a party to this agreement, shall entitle the holder to practice in any of the states so agreeing.

Second—That identical questions shall be used by those states which could hold examinations simultaneously, but that the committee shall provide separate sets of questions, of equal grade, for such states as could not agree to simultaneous examinations.

Third—Each State Board, in addition to using the National Committee's questions for the theoretical examinations, should conduct a practical examination, the successful candidate, however, not being compelled to pass another such examination when presenting his license to another state.

Fourth—That each state, party to this agreement, shall pay a stated fee for its set of questions, the fee being higher where special questions are provided, the sum thus raised to be a remuneration to the committee for the arduous labors which would be entailed by this plan.

This ends my report, gentlemen; but before closing I beg that the opportunity now afforded of inaugurating a movement which may bring us a solution of this problem, be not lost. May I ask the society to take some definite action upon the proposition here expounded? If the final plan here set forth seems adequate, will the society so vote, and so voting will they send a communication upon the subject to the National Association of Dental Examiners and to our National Association, urging a trial of the plan?

Discussion.

Dr. C. S. Butler. We are so far removed at this session from the presentation of the report that it will be a little difficult to get back to the trend of thought and argument as presented by the correspondent. However, I think we all recognize that this question of interstate comity in the exchange of dental licenses is an important phase of the subject that is interesting the dental profession at the present time,—*i.e.,* dental education. One of the most encouraging things is the fact that dental societies and many of the leading members of our profession are devoting so much time and thought to various phases of dental educational problems. There has never been a time when so much of the energy and thought of the profession has been directed in these channels as at present.

However, there are some things in reference to the interchange of licenses that are necessary to accomplish before the exchange can be properly effected. It seems to me that the unification of dental laws practically underlies the whole problem. If we consider for a moment the very great divergence in state laws in this country, we shall see how varied are the ideas of the profession in reference to legislative enactments affecting the practice of dentistry in the different states.

The Dental Cosmos for March, 1899, presents a most admirable codification of state dental laws of this country. That wide divergence of thought and legislative expression must be harmonized, brought together, and unified so that the laws of the various states present practically the same ideas before this question of interchange of licenses can be properly settled. Then, again, there is the unification of the preliminary standards. This relates more particularly to the preliminary standards or requirements of schools. There has been a great advance along that line during the past few years, and it is very encouraging that the colleges are approaching practically a uniform standard. For myself, I feel hurt that there should have been so much criticism in the correspondence presented by Dr. Ottolengui of the various colleges. Perhaps those things are true of dental schools here and there, but we all feel that the majority of our schools are honestly striving to eliminate all irregularities, and to do what they can to advance, uplift, and uphold a higher, cleaner, and better method in their conduct. In this they should be encouraged rather than constantly censured by the profession at large.

To my mind there are some things that are a great deal harder than the deprivation of the interchange of state dental licenses. To illustrate: Within two weeks I received a letter from a man wanting to enter practice in the state of New York. He was a graduate of 1893, and gave the information that he was already registered in five different states. There is an enormous number floating from one state to another, and from one section to another,—doing nothing for themselves or the profession. They are a heavy weight, and must depreciate in a marvelous degree the standard of the profession. The man who confines himself to a particular work and to a particular and specified locality, determinedly, is the man who accomplishes the best results in the end; so that it is not, to my mind, a serious deprivation to many men that they are unable to pass easily from one state to another to enter practice.

I am glad this subject has been presented, and that the correspondent is interested in it, because we all realize and appreciate that when he is sufficiently interested he accomplishes a great deal. I believe some good can be accomplished in the consideration of this question, but that we are to expect any immediate results in the near future I question seriously. I am glad also it is being presented, because to my mind it is simply another phase of the great problem which ought to interest the profession above all others,—that of the education of the young men who are soon to enter our profession. We ought to make their entrance easy, but we should insist that they shall be well prepared, that they shall be trained gentlemen, fit to enter a profession that is honorable to all those who engage in it honestly and honorably.

Dr. OTTOLENGUI. Mr. President, I would ask that you kindly call on our own examiners to express their views.

Dr. FRENCH. My views were well expressed in the report.

Dr. JARVIE. I think it is highly desirable to have an interchange of licenses to practice dentistry in the various states, and I think we are very much indebted to our correspondent for the immense amount of labor that he has done in endeavoring to further this end. It would be a good thing for our profession and for the country at large if a man who had proved himself qualified to practice dentistry should be able to practice in any part of the United States, and not be confined to any one section. Whether the direction in which the correspondent is exerting himself will bring out this result or not I am not positive. I can see some difficulties in the way. The United States covers a large area. It embraces territories the living in which is under varied conditions. Sections of this country are thickly populated, and there are sections in which the population is very sparse and people are struggling for a living. The conditions in the East are very different from what they are in the West and Northwest. Idaho, Washington Territory, and such far away sections are so different from this part of the country that we must not expect for some time to come to be able to fix the same standard there that we have here. In the mining and agricultural sections of the country the people need the services of some one who will at least relieve them from the pain of an aching tooth, and the man who travels around with a kit and a set of extracting forceps has all the requirements to relieve them of that pain. It is the needs of to-day that must be served. It will be difficult to get such communities to accept the standard we have here. That is the great trouble, I believe, in getting any sort of a unification of law, or of standard of education throughout the entire United States; but I do not think the day is far distant when we will have in a number of states the same standard required for admission into our dental schools, and the same standard of excellence required to procure a license to practice dentistry.

The action this society took yesterday in indorsing the Examining Boards of Pennsylvania and New Jersey is to my mind a step in this direction, and I believe that it is the beginning of something which will spread quite rapidly,—as rapidly as it is wise to have it spread among the states in this part of the country. Of course, there will not be a universal acceptance throughout the country of the same standard. I fear this is all we will be able to accomplish for some time to come. I do not say this with the idea of discouraging the efforts that our correspondent has been putting forth, or the efforts that any one else may put forth in this direction. It is a good work, and I do look forward to the time when it will be accomplished.

Dr. S. B. Palmer. It would be difficult for me to add anything in regard to what has been so ably stated by Dr. Butler and the other gentlemen who have expressed their views. Of course the much-desired object cannot be attained very soon. The work will have to be done gradually.

I think it would be a retrograde movement for the profession to lower its standard for preliminary education. That really is the basis upon which the profession rests. Once a creditable standard is established, other states will fall in. It may be a slow process, but when the line is drawn progress will be upon the side of education. Upon that basis the medical and dental professions can agree.

Dr. Hofheinz. I am very glad to speak on this subject, and I am very grateful to Dr. Ottolengui that he has brought up the subject and given us such elaborate correspondence. As a representative of the schools, I am grateful to Dr. Butler that he has expressed such a kind idea of them. If any of the schools in this state have not fulfilled their duties as far as the legal part is concerned, sufficient means are at command to compel them to do so. I do not know whether that is so in all states. I take exception to what Dr. French said in his answer to the correspondent. As long as schools are conducted for the financial benefit of the few, they will never amount to anything. I know that long before I was connected with them there was a popular view of an enormous income from the infirmary. It would probably be irrelevant if I were to read a proposition that the Buffalo College made to the Buffalo Manufacturing Company. We requested them to take charge of the entire infirmary, giving them of course the rooms and furnishing the chairs, they to furnish the material and pay the instructors, and we giving them $1000 a year besides. They looked into the matter and refused to accept it, because they could not see any money in it. The other expression that Dr. French made, I agree with. I believe that the dental colleges have not, as a rule, reached that ideal standing that they ought to occupy. I do believe if it were possible to bring dental colleges under the same rules and regulations that they are brought under abroad, we would have colleges of the most ideal order; but whether with our political differences that would be possible, I question very much. We do know that a great many of our institutions which are under state supervision are not (unfortunately) nearly as well controlled as those under personal supervision. For that reason, I fear it will be a long time, except our political institutions change, before we can reach that ideal that some of the correspondents have intimated as the standard we should occupy. We can never have a satisfactory educational condition until we have unification of the law. This is practically a corroboration of what Dr. Ottolengui has said.

As the conditions exist to-day, I think it is an injustice to the members of the profession, to the students, and to the colleges of the state of New York. We have governing boards, and there is no man in this profession who has a higher regard for the governing board of the state of New York than I have; but their work and operations are limited, like that of any other body. They judge the qualifications of a student who comes from the outside of this state by the amount of written material before them, and it is the only way they can do. Any teacher knows that even inferior men can cram their cerebral minds full of knowledge of that kind, but it is only the well-trained mind that has received a good early training that will retain and properly appropriate and use the knowledge which has been given. For that reason the student who has received the highest preliminary education will always be the better man. There may be reasons for some states in the South or West to have a lower preliminary, but there never was a good reason for the state of Pennsylvania or New Jersey, or some others, to have any different standing from the state of New York. I shall be more than pleased, especially from the point of the teacher, if what Dr. Ottolengui and Dr. Jarvie said will come true. It will not be until that unification has taken hold in general that we will have the proper educational progress which we certainly ought to have as a nation, the same as we do commercially and industrially.

Dr. John I. Hart. I am firmly convinced that all the laws passed concerning the finished product will be of no avail until the standard of entrance to the colleges is equal all over the country. Pennsylvania approaches the New York standard to-day, and consequently it seems wise for us to pass in this body the resolution that recognizes her graduates, but until other states are willing to establish an entrance standard equivalent to our own I think any work done in this line will be of little avail.

Dr. Sanger. It is an axiom that "Rome was not built in a day." All great movements go by gradual gradation. It seems fitting in this great movement of the advancement of the dental profession that New York state should lay the cornerstone, as it has done, and that in every arch of the structure that is built the keystones shall be those bearing the coat-of-arms of New York state. This proposition, coming from Dr. Ottolengui as your correspondent, seems to be a keystone, because it marks one step forward; but the fact remains that you cannot accomplish any great movement by any sudden legislation or resolution. It has got to come by gradual growth. We are growing, and to-day the standard of the colleges is higher because of the pressure put upon them by the Examining Boards in the various states, and they are higher as you approach the Atlantic seaboard, because the conditions of general education are higher, because the conditions of social standing are higher, and consequently the demand creates the supply. That Dr. Ottolengui has offered two or three possible solutions of this question is commendable, in that it shows a great deal of thought surrounded by conditions which enhance that thought; and while it is not probable that any of these propositions is the real solution of the question, still they will lead up to a final solution. As representing a college, I am free to say that no college which is honest in its intention to give a *quid pro quo* to a student for his money fears any standard that is set up for it. In spite of the letters read and the innuendoes thrown out, there are many colleges which seek to turn out a finished article, as far as it is in the power of one set of teachers to compel a student to assimilate that which they give him, and who glory in the high standard set up where their students go for examination. They are willing to have the examining board turn down the men who by trickery, by chance, or by good fortune have slipped undetected in their deficiency past the barriers which they had hoped to raise against such actions. It is impossible to make any system perfect, and so it is impossible to make perfect the examining system of a dozen bodies. If they have slipped past one and are caught in the second, far from being a disgrace for the first, it speaks well for the second; and the second having a few, while the first had many, have succeeded in catching them.

Dr. Ottolengui. My report was so lengthy in matter furnished by those with whom I corresponded that in winding it up I added nothing of my own views, but merely made deductions from the views of others. I will call your attention to a few facts from my personal standpoint.

The proposition was made by one of the correspondents that the only solution of this problem would be a degree under national governmental control. Another correspondent called attention to the fact that even the examining boards seem to fail to grasp the scope of dental law, and that dental law is a part of the *police* restrictions of a state. Any of you who have tried to get any bill through Congress must know that as it is difficult to get a bill through a state legislature, so it is a thousand times more difficult to get one through Congress, unless it should be of great national importance. Even to-day it is announced that the President of the United States, desiring certain bills to be passed next year, feels that he must call the session a month ahead in order to get his own bills through. What chance would we have, even though ours be a constitutional bill? A bill regulating the practice of dentistry in various states would be *unconstitutional*. The fundamental principles make it impossible to have a police restriction which shall govern all the states, consequently it would be necessary to change the Constitution of the United States before we could ask Congress to pass the bill; and it is futile to discuss any such Utopian bill as that at present.

Dr. Butler's idea is equally far in the distance. If we could agree to-morrow upon a single law which should be satisfactory to the profession throughout the United States, and if it could be introduced into forty-seven legislatures during the coming winter and a dental law passed in each of those states, we should have forty-eight or forty-nine laws different from the one we sent through. It is in recognition of these facts that your correspondent endeavored to find something which would meet the laws as they exist at present.

What is the special necessity of having an interchange of licenses? We have been told by Dr. Butler that there are a number of men moving from state to state who should not be encouraged so to do; that they are not men whom we should assist. But there is a fundamental principle in legal ethics that it were better for ninety-nine criminals to escape than for one innocent to be punished. It is better that these traveling dentists be allowed to travel than that one good, honest, conscientious man should be forbidden to practice in another community because he has forgotten the definite answers to the questions which will be asked him.

As to the constitutional aspect of it: As difficult as it would be to have a unification of legislation,—a single law passed by all the legislatures throughout the United States,—equally easy would it be for those who endeavor to fight our laws to have every law wiped out. Every one of our laws is probably unconstitutional, in that it restricts the right of a man to earn his living. A similar law in England has been upset. You cannot restrict a man from making his living. The only semblance of power which the English law has to-day is this: the registered dentists in England are the *legal* practitioners, but the other men who practice cannot be interfered with until they do that which causes suffering. They have the right to practice upon those who choose their services. All whom they can attract they can work for, but if one of their patients should dispute a bill of theirs they have no standing in court to collect it.

A man is restricted here from passing from one state to another, and it will eventually lead some one to attack the laws on constitutional grounds. We should effect an interchange of license in order to keep our laws and prevent a test of the constitutionality of them. The standard of examination would be the same if the examinations were conducted on identical questions; therefore the standard of license in the various states would be immediately raised to a level which you cannot hope to attain by legislation, but by agreement of the various states. It is much easier to get the examining boards to agree to this than to get the legislatures, composed of men who are not professional men, to help us to any such standard.

As the correspondents of seventeen states seem to consider favorably that view, it does seem that it is worthy of an attempt to carry out the scheme. The only difficulty in the way of the scheme —one which I did not touch upon—is the appointment of the committee which shall formulate the queries. The examining boards will probably prefer that these questions shall originate with a national committee, which shall be appointed by themselves. It does not seem to me that this would be unwise, but, on the contrary, that the National Board should be a joint committee of the National Association of Dental Faculties and the National Association of Dental Examiners; not that I desire to favor the faculties or the colleges, but the Faculties Association have a standard for examination and the Examiners have a standard for practice. Carrying out the standard for practice, the men will ask questions of a candidate the replies to which have not been taught to him in a college. It does not seem fair, therefore, that the candidate who has honestly paid his money, attended the lectures, and grasped what has been taught to him should be refused a license because he cannot answer questions which have not been taught to him. This would be eliminated if the questions to be asked originated from a joint committee, the men who stand for practice and the men who stand for the teaching.

Dr. JOHNSON. In the discussion that has arisen here to-day they all have agreed that there were great difficulties in the way of bringing about the desired object, and with very few exceptions all agreed that it is a thing well to be attempted, a step in the right direction. I therefore wish to move that the plan outlined by our correspondent shall be forwarded to the National Association of Dental Examiners, as it seems to be worthy of their approval, having been approved by examiners of seventeen states; and I have no doubt, from the discussion, that it is approved in a general way by the society here to-day.

The secretary read the resolution presented by Dr. Johnson. Resolution adopted.

Dr. BUTLER read the following resolution:

"*Resolved,* That if the editor of the DENTAL COSMOS finds it inconvenient to print the correspondent's report in the July issue of that journal, or earlier, the correspondent be authorized to present copies to all the journals desiring to use it, as it is understood by those who have contributed to the subject that the matter will be made public prior to the meeting of the National societies."

Resolution adopted.

(To be continued.)

NEW YORK ODONTOLOGICAL SOCIETY.

A REGULAR meeting of the New York Odontological Society was held at the New York Academy of Medicine, No. 17 West Forty-third street, on Tuesday evening, March 21, 1899.

The meeting was called to order by the president, Dr. S. G. Perry, and the minutes of the last regular meeting read and approved.

Dr. HODSON, chairman of the Clinic Committee, reported as follows: Mr. President, I am sure the gentlemen will all admit that we have had a "red letter day" in our clinic this afternoon. Dr. Stewart gave an example of his method of treating pyorrhea alveolaris. I will not say anything about it, because the paper of the evening will treat of the same subject, and Dr. Stewart will in some sense report his own clinic.

INCIDENTS OF OFFICE PRACTICE.

Dr. S. **FREEMAN.** Mr. President and gentlemen, I wish to report two cases which I think will be interesting to the members of the profession:

Case No. 1. Miss Hannah C., a governess, called at my office on January 19, at 4.30 P.M. She was suffering excruciating pain in all the right lower teeth. I asked her how long she had been suffering, and she informed me that the pain was intense and had been so for the last fifteen minutes, and between her sobs begged me to relieve her. The history of this case is so peculiar that I must give it in detail. She was sewing when she was startled by the report of a revolver close to her head. She immediately became hysterical, and suffered from excruciating pain in her teeth. Upon examination of the teeth I found the first lower right bicuspid somewhat discolored and of a pinkish hue, and concluded that the pulp was congested. Upon opening the tooth and the pulp, the patient had immediate relief. This tooth was not carious, and I asked the patient if, upon the report of the revolver, she closed her mouth suddenly, giving this tooth a sudden blow. She says that she had her mouth closed at the time, and immediately suffered intense pain. There is no doubt that the cause of the congested pulp was due to a shock of the general system, manifesting itself in the first lower right bicuspid.

Case No. 2. Mr. K., a gentleman, twenty-eight years of age, called upon me February 21, 1899, stating that he was referred to me by his physician to have his teeth examined, as his neck was swollen. Upon examination I found quite a swelling on the right side of the neck, situated an inch below the margin of the jaw, in a direct line with the roots of the second molar. Upon examining this tooth I found the buccal and masticating surfaces filled with amalgam, and the tooth sensitive to heat and cold. I thereupon examined the submaxillary gland, discovering a swelling of the tissues, which were quite fibrous and hard. I concluded it was a case of ranula, which diagnosis was verified by Dr. Gerster, a surgeon, whom the young man also consulted. He also stated that he thought the gland contained a salivary calculus.

Dr. Gerster operated on February 25 in the following manner: He first introduced an aspirator into the gland, and we found the fluid thick and stringy, typical of this disease. He then opened the gland thoroughly, the swelling entirely disappearing, and upon introducing a probe into the wound we could not find the supposed calculus. We then introduced the probe through the tissues of the neck, at the same time pushing the gland outward and forward, when our probe could readily distinguish an obstruction, which was held so tightly by tissues that it could not be removed by the forceps, but had to be scooped out with a surgical spoon. Through the kindness of Dr. Gerster I will pass around the salivary calculus, which you will see is quite large. I may say here that you seldom find a calculus situated as low down in the gland as was this one.

Dr. Wm. Jarvie. I do not understand where the incision was.

Dr. Freeman. The incision was made in the gland directly in front of the swelling.

The paper of the evening was then read by Dr. Howard T. Stewart, of Greenville, Miss. It was entitled "Partial Removal of Cementum and Decalcification of Tooth in the Treatment of Pyorrhea Alveolaris," and is printed in full at page 617 of the current number.

Discussion.

Dr. O. E. Hill. I want to know what Dr. Stewart means by "quite firm,"—whether the roots are loose, or whether they are really firm in the jaw.

Dr. Stewart. I do not claim that when the teeth are treated in this way they are as firm as perfectly sound, healthy ones. I say that they are very firm compared to what they were when the treatment was first commenced, and are firm enough to support a bridge.

The president then requested Dr. Littig to take the chair and preside at the meeting.

Dr. Littig took the chair.

Dr. J. E. Sayre. I can only reiterate or bear testimony to the truth of what Dr. Stewart has stated. He has not overstated it in any particular. Mr. Havemeyer has been in my hands for years, and when, after an accidental meeting with Dr. Stewart in the West and some correspondence with him, Mr. Havemeyer laid the correspondence before me, I told him that if he himself had faith to go and try Dr. Stewart's treatment. After an absence of a few weeks Mr. Havemeyer returned to me in doubt, and asked me to look at his mouth and see if he had obtained any benefit, and I admitted that I would have been very proud if the results had been obtained at my hands. It was clearly a case of Riggs's disease, with the usual final *dénouement* to be expected, and certainly Dr. Stewart has, for the time anyway, stopped the ravages of it. The teeth were really very loose when he began the treatment, but are very much solidified at his hands, and I do not think, the patient being willing, he has attempted too much under the circumstances.

Dr. S. G. Perry. I saw the patient for whom Dr. Stewart had operated at his home in Greenville, and the result was certainly a most remarkable one. My first thought was that his treatment must have been analogous to the implantation of teeth, and I said to myself, without remarking it to him, that had I not known what treatment had been applied I should have guessed that the teeth had been extracted and cleaned and put back in their sockets, and had grown fast. Whether bony union had taken place or not, they seemed to be firm. There was that satisfactory condition around the roots of the teeth and the gums that would lead one to say it was a cure, not an alleviation. The gums were attached, and had a natural appearance, whereas before that the patient told me they exuded pus continually, and the teeth were loose and wabbling about more or less.

I presume most dentists have some theory as to the cause of pyorrhea. I have mine, and I hold to it to-day, just as I did when I announced it over sixteen years ago. I have never for a moment doubted that it would some day be generally accepted. I cannot demonstrate it, but, just as an old woman keeping house knows a great many things by the simple exercise of common sense, I feel sure that in the presence of germs in the mouth we have a cause that can account for the loosening of teeth. They may not be the sole cause, but I believe they are the ever-present and most active cause; and it has long been a wonder to me that so many of our learned men should go round Robin Hood's barn in search of a cause when in every mouth are myriads of germs, and in many mouths are flabby gums and loose teeth which might be caused by these germs. We have all heard the changes rung on malnutrition, imperfect articulation, and even the use of wedges, as a cause of pyorrhea. How many hundreds of cases have we all seen where the vitality was of the highest and when "nutrition," shown in other ways, was all of which the human body was capable; and, as for imperfect articulation, how many countless cases have we all seen of loosening teeth when they articulated and when they did not! And yet it must be said that teeth that do not articulate loosen rapidly,—as might be expected if due to the presence of germs, for if you want to make a germ happy let him alone while he is at his devilish work! And around teeth not used he can be undisturbed. Wedges, by starting a pocket, may cause the beginning of local pyorrhea,—another argument in favor of germs,—but how many cases do we all see where wedges have never been used! And then we hear about uric acid as an important factor. But, if that were true, why should not all the teeth be more evenly affected, whereas we all know that pyorrhea exists in "spots," here and there a tooth loosening by the side of one that remains firm.

And yet, except by the exercise of the aforesaid common sense, it may not be possible as yet to prove that germs are the cause of pyorrhea, though I believe it will yet be done, following in the line of Dr. Williams's brilliant researches. But I would like to present the subject in another way, and ask if it can be demonstrated that all the conditions we see in cases of pyorrhea *cannot* be caused by the insidious and persistent presence of germs. Where is the evidence to prove that even the calcification of the cementum which Dr. Stewart claims may not have been due to the detachment of the gum caused by the choking, persistent, insinuating presence of germs? And, again, is not the enormous use of germicides in the treatment of pyorrhea on the part of all operators, whatever their theory as to the cause, an unconscious evidence of belief in the germ theory? What would be the use of breaking up germ nests around the roots of teeth if pyorrhea is due to "something else"?

It is admitted that Dr. Riggs did actually cure some cases of pyorrhea, and if his instruments and his method did not break up the germ nests I think Dr. Stewart's will. And this is the reason I believe that this radical method is the only one that will ever really cure the disease.

I cannot let this occasion pass without referring to the published record of the theory I put forth before this society, not only as to the cause of troubles around the ends of the roots of teeth, but also as to the cause of pyorrhea. So far as I know, that theory was new at that time. If others had advanced it I was not aware of it. To-day I think it is safe to say all that I claimed then as to the cause of trouble around the ends of the roots of teeth is accepted as true, and forms the basis of the present practice. Some day I predict the same will be true of pyorrhea.

A man of blessed memory, whom we all knew, was sometimes fond of giving indisputable proof that he had said so and so many years ago by reading from the published literature of our profession, and I am tempted to follow his example and quote from a paper I read before this society in 1883, entitled "Preparing and Filling the Roots of Teeth," and published in the April DENTAL COSMOS for 1883. In this paper I attempted to prove, as before stated, that the presence of germs in and around the ends of the roots of teeth was the cause of the serious trouble so often following the closing of the canals. I also stated my belief as to the loosening of teeth as follows: "And here let me wander from the subject to say that I am inclined to believe that many of those cases which we see of inflamed gums, absorption of the alveolus, and loosening of the teeth are due to the insidious presence of these and other persistent organisms. If such loosening is due to lack of tone, as we are often told, or to accumulations of tartar, as some contend, why do not all of the teeth loosen at about the same time? whereas we know that here and there a tooth loosens and drops out, while the others stand firm and strong. If due to accumulations of tartar, why do so many teeth come out absolutely free from that substance? But if we consider this destructive process as due to the insinuating presence of these organisms it is easy to believe that when they get a foothold here and there under the gums they will multiply, and slowly but surely work their fatal way to the ends of the roots themselves."

Now, gentlemen, I have never for a moment varied in my belief as to the cause of this condition that we are called upon to treat, and I cannot escape the conviction that what has been demonstrated here by Dr. Stewart is a confirmation of that view, as I have also felt for years that my experience in the implantation and transplantation of teeth is the confirmation of it, because I have so many times seen teeth with sockets in just such a bad condition return to a healthy state as soon as the new conditions were established. Any one who saw this operation at the clinical chair, the absolutely radical conditions in which it was performed, would be convinced. There could not be anything more radical except taking out the teeth and putting them back in a renewable, healthy tissue. In the healing process there will be the exclusion of the germs.

Certain we are of this at least, that there is some sort of an attachment when the tooth becomes firm. Just what that attachment is I am not sure, but there is a sort of attachment which serves the purpose of holding it in its place and making it comfortable, and making sure that it will last; how long we do not yet know. Please do not assume that all teeth treated in this way are going to be lost by absorption. The question has been raised that Dr. Stewart's treatment is so radical that it seems almost like implantation. And the question is raised whether they will not be lost; whether they will not be loosened finally by absorption in the same way. Do not let us have too much fear of the danger of that absorption, because teeth can be made firm for a great many years and be of great service. After all these years of implantation of teeth I am stronger in the faith to-day than ever; not indiscriminately, of course, but in the judicious implantation of teeth.

If the implantation of teeth under suitable conditions is a scientific proposition to start with, it may be the key to the more intelligent and successful treatment of these cases that have baffled us so long. I will not take more of your time to show to you the reasons which cause me to believe that germs are the most active factors in causing pyorrhea, but it is clear to my mind that if their presence in the mouth and their insidious secretive action in sheltered places and in pockets could be prevented, this trouble would not exist. I am very sorry indeed I did not bring here a case of four molars, two above and two below, so very loose that they were taken out, fearing that they might be swallowed, and the bicuspids and cuspids, in the mouth of a lady forty-five or fifty years of age, as perfect as in a girl of sixteen. With the firm teeth there had never been an opportunity for the germs to get a hold under the gum. If the loosening of these teeth had been due to a systemic condition, why should not all the teeth have shown the same signs?

If this theory of the presence of germs in the mouth is the true theory, then I cannot help but think that Dr. Stewart is working in the right direction, because what he accomplishes in the manner in which he treats the roots of these teeth is practically just what is done in the matter of implanting a tooth; and I have never seen an old socket wall so discouraging that if I could get the bur in it and roughen it I could not implant a tooth. I never saw one go wrong yet; never saw a bit of serious trouble after implantation of a tooth. If proper antiseptics are used there is no danger from it, and there is no danger from the severe inflammation that is to follow this operation of Dr. Stewart's. Those gums will be sore, but there is no danger in that; because I have seen it too many times, and I know too well what nature will do in these cases.

Gentlemen, there is a great deal in the implantation of teeth. Now there may be a great deal in the treatment of teeth in this way. Certainly, I should have said that Dr. Stewart's patient's teeth had been extracted and implanted, because they had that appearance. They were solid and comfortable and serviceable, and that is what we want.

Dr. Geo. A. Mills. I have been so interested in Dr. Stewart in this matter that I commend him to every man. He has the courage of his convictions, and I admire that class of men. If old Dr. Riggs were here to-night he would be the happiest man in this room. The principles are exactly what Dr. Riggs advocated, and the results are the same. Dr. Riggs used to claim that he cured the cases of which he had control. He may not have expressed himself in the same way, but any man that knows familiarly the method of Dr. Riggs's treatment, his style of instruments for the purposes that he made them, and the instructions he gave, will see that he aimed at the same thing as Dr. Stewart. He removed all degenerate conditions; not only deposits of tartar, but the degenerate condition of the cementum.

I saw the tooth Dr. Stewart worked on this afternoon, and it was an intensely interesting operation. It was a case of extreme pericementitis, pushing the tooth out by mechanical pressure, forcing it out of the mouth labially, leaving the pocket on one side. He showed us that there was an extra amount of tissue there, and he had to remove all that and get his tooth into position by overcoming that difficulty.

Dr. Perry said when he got up to speak, "What do any of us know about this?" Practically, I know something of it, but there are cases which Dr. Nash terms "idiopathic cases" in which there are no deposits. During the last year I have had results that I never had before; the thought was suggested to me through the reading of Dr. Nash's book, although I find Dr. Nash does not agree with me.

I sent a short paper to the meeting at Boston last summer, giving my theory and the result of the cases. I will mention one case. A gentleman came to me with a loosened sound bicuspid. It was one of those teeth that you could push up and down, and it would discharge every time you pushed it. My first thought was that it was an alveolar abscess, and I drilled into the tooth, but found the pulp living. Finding no response from the treatment, and the pulp being alive, I put in a preparation and destroyed it. In a few days the gentleman came to me, and I opened the tooth and took out the pulp. I forced my medicine through the apex of the tooth until it came out all around. I made only one dressing, closed it up for the day, and when I thought it was quiet I filled it with a cement filling, and asked the gentleman to be kind enough to let me see it in the course of a month. That tooth is absolutely tight after six weeks. It was the only tooth affected in the mouth. My thought is, as Dr. Stewart has suggested, cutting off the blood-supply of the pulp and throwing it to the cementum.

It is my strong impression that in the near future it will be the general practice to destroy a large proportion of pulps in aggravated cases.

Dr. M. L. RHEIN. Mr. President and gentlemen, as the essayist has seen fit to quote me in a number of instances, I thought it would be hardly fair not to say something in regard to the subject of the evening.

I echo very cordially the sentiments of all the speakers of the evening in being extremely pleased with the earnest and conscientious manner of Dr. Stewart in the treatment of this trouble. The unfortunate thing in regard to this malady has always been a desire on the part of a great many men to prove the correctness of their own theory, to ignore everything that antagonizes the theory, and to simply look constantly for everything that would tend to prove the correctness of their individual views.

Now it is remarkable that the treatment as outlined at the clinic to-day by Dr. Stewart is corroborative of Dr. Perry's theory and Dr. Mills's theory. I must confess that I could see nothing novel in Dr. Stewart's treatment, or anything inconsistent with the methods that I have pursued, so that to a certain extent it corroborates any theory that I have ever advanced on the subject.

There are two distinct points raised by the essay, and there are two points of discussion. One is the treatment he has outlined, and one is the etiology or the theory that he has presented.

In regard to his treatment I have only the highest praise to give. There is a possibility that in some of the cases his operations are a little unnecessarily extreme. There is in my mind no advantage in going more than the slightest distance beyond the line of demarkation of the pockets, but up to that point the instrumentation cannot be too thorough, as outlined by the essayist.

There is, however, a cause for considerable future trouble if the entire pericementum is removed, as the doctor does when he entirely surrounds and severs this membrane from the root to the further end of it; and to me his paper was a little inconsistent when he speaks of the portion of the pericemental attachment remaining after he has entirely severed it. Of course, he gets a new attachment, as expressed by Dr. Perry this evening, the same as we get in implantation, the irritation resulting in a new calloused attachment to the alveolar socket.

Dr. Stewart's quotations of remarks of my own this evening were in the main correct. In one case I must make a slight correction, where he stated that he asked me what result the cure of the systemic disease would have upon the pyorrhea, and I said that the pyorrhea would remain because of a lack of inherent vitality. That is true qualifiedly only. It is true of a certain class of pyorrheal cases that we get; in a much larger percentage of cases the cure of the original trouble brings about the cure of the pyorrhea. These are cases that very seldom come under the notice of the dental practitioner, and in order to prove that it would be necessary to take you through the wards of any of the hospitals in the city and show you the mouths of the patients suffering from severe nutritional diseases, acute diseases, especially young people. You will find all the symptoms of pyorrhea at certain stages, and you will find that they are all cured after the cure of the disease.

The question of the etiology of pyorrhea is one that has greatly interested me for the past fifteen years. I commenced the study of this subject in 1881 with the late Dr. Atkinson, whom we all revere very highly, and the views that I have enunciated on this question I have held mainly through the instrumentality of his teaching. I want to say here at this meeting that I have held them because I have never seen anything that could demonstrate the incorrectness of these views, and I have held them open to conviction in order to change them at any moment. Every member of this society knows that the one point in Dr. Atkinson's life was that he was ever striving to get at the truth of the matter, and no one was ever more ready than he was to drop any theory that he held if it could be shown to him that it was incorrect. I have always endeavored to follow this point.

I cannot see anything in the demonstration that Dr. Stewart has given us that has any scientific value. There is so much to contradict in his etiological theory that I want to state one or two points in order to try to show how incorrect they appear to me. I say this with the most cordial feelings toward Dr. Stewart, because I am certain that he is accomplishing a great deal of good. The only reason that I have in making the criticism is that we ought to have a scientific basis for the methods that we pursue; and, although we may pursue the same methods and accomplish good results, we ought to endeavor to come to some conclusion as to the truthfulness of the cause of this trouble.

He stated that the disease is due to the hypercalcification of the cementum, and for this reason he removes as much of the cementum as possible. That, to me, for a time was hard to digest in any manner. Take the most common example of hypercalcification of cementum, the condition of exostosis of the root. You have there a condition of hypercalcification that does not require any microscopic demonstration to prove. I have yet to find a gentleman who found such a tooth dropping out of the mouth of its own accord. We all know how tightly and firmly they are attached, and how difficult they are to remove when we desire their removal.

Now for the theory itself; this extreme condition of hypercalcification is merely a proof of how erroneous this theory is, as I look upon it. How does this hypercalcification appear, as we see it in cases of several years? It arises from the excessive nutrition that the pericementum receives. The more inorganic material that is brought to the cementum of a root and deposited there, the more highly nutritious the blood-supply must be that brings it there, and the more thorough and the more entire must the attachment be of such a root to the alveolar socket to receive this additional supply of inorganic material.

On the contrary, how do we find the condition of the cementum where the pericementum is lost? Do we find the rounded full surface of the cementum, or do we find it filled with bay-like excavations, showing the loss of the inorganic substance? My own observations show that in almost all these cases it is rare to find one that is free from distinct evidence of the resorption of a portion of the cementum at this stage.

It is impossible in the time allotted to me this evening to demonstrate as I would like the reasons for the assertion that every severe case of pyorrhea is not and cannot be a local affection, but is simply the result of the nutritional disturbance of the system manifested at a particular tooth, because at that particular tooth there is less nourishment brought than at the other teeth, and because the fighting vitality at that particular tooth is less powerful than that of other teeth.

That replies to a certain extent to the query of Dr. Perry, when he asks why the pyorrhea should attack a certain tooth more than another. Just as a certain tooth is more prone to caries than another tooth,—the inherent vitality of the teeth varies. At the time of life when the germs of such teeth were formed the conditions were different; the conditions vary every day, and we all know how different the teeth are. Outside of that fact remains the distinct point that the line of circulation extending to one tooth may be entirely different from what it is to another tooth. I do not want to deprecate for a moment the amount of trouble that is caused in pyorrheal pockets by germs,—by the bacteria that rest there. There is no doubt that these play an important part in the loss of the teeth from this trouble, and from the progress of the disease, but that they are the direct cause of the trouble, or that there is any direct local cause of the trouble in a certain class of cases, is the point on which I desire to take issue.

I do not want to contend that there is not a class of pyorrheal cases that are distinctly local. There is no doubt that we can get up a distinct form of pyorrhea by local irritation, but this condition varies considerably from the condition generally known as pyorrhea. None of the cases that I saw to-day at the clinic had any local cause, in my opinion. To me it was almost a self-evident fact that they were the direct result of some trouble in the nutritional supply. There was none of them that showed that more beautifully than the patient sent to the clinic by Dr. Hoag, where some teeth had been lost, but the nutritional defect was marked throughout the gums surrounding every tooth in the mouth.

Dr. J. F. P. Hodson. Mr. President, although it is scarcely, strictly speaking, on the paper or the subject, there is one cause for pyorrhea that I have always felt in my own estimation, and that is, a low grade of inflammation in the socket,—a very low grade, if you please, but still a continuing one, arising from malocclusion.

I do not know when I have seen an ideal case or instance of true pyorrhea where the occlusion was absolutely solid and substantial. One will almost always find that there was some sliding bite that would keep that tooth moving in its socket sufficiently to set up that grade of inflammation that would produce the very exostosis upon the root that Dr. Stewart speaks of, and the further disturbance of nutritional elements that would produce the pyorrhea.

Dr. Perry. I would like to ask how it is that if Dr. Rhein's tooth has such low vitality as to become loosened, etc., when it is taken out and a new tooth put into the same socket it would grow fast and be clean and sweet. How do you account for that, if there never could be any healthy condition afterward?

Repeatedly have I taken out old molars and measured them and put new molars in their places, and secured a clean, healthful condition; the bugs are "dispossessed," and nature can once more assert herself.

Dr. RHEIN. In answer to that I would say that it is a question of surgical precedure pure and simple,—an implantation. In removing the bone, a bony irritation is set up which is bound to produce a new callus. If the patient upon presentation is in good health, we are bound to get the result Dr. Perry speaks of; but the operation will fail in any case where there is a diseased condition that is not held in check or is allowed to progress at all. In the same way it is utterly futile to adopt this method that Dr. Stewart illustrated to-day, or any other method of locally treating pyorrhea, if the patient is suffering from a trouble that is the cause of the disease, and that trouble is not under control.

I do not know whether I make myself clear to Dr. Perry or not. For instance, if a person is suffering from diabetes or Bright's disease, not held in check, treatment such as this would not be successful; it would only prove an irritant. I have seen such work as Dr. Stewart outlined at his clinic (and which Dr. Mills justly compares to what we know as the Riggs treatment of the trouble, with the exception of the removal of the pulps of the teeth) result in the most intense irritation, and the most destructive tendency to the teeth in aggravated cases of diabetes not under treatment, and again in other cases I have seen it bring about the most beautiful results, as far as recovery of the patient goes, from an acute attack of pyorrhea.

Dr. HILL. I practice to-day and have for twenty-five years according to the treatment prescribed by Dr. Atkinson.

In 1870, or about that time, a surgeon in London named Pupke introduced sulfuric acid in the treatment of diseased bone. Two or three years after that, Dr. Atkinson took it up and introduced it to us. Some twenty-five years or more ago, Dr. Riggs gave his first clinic in Brooklyn, where we then had an infirmary. I was at the clinic, and really I thought it was one of the most inhuman processes I ever saw indulged in in the human mouth, with those scoops and shovels. It has been my habit to use sulfuric acid in all cases of pyorrhea from whatever cause, and almost nothing else in the way of medicine.

There is something in this paper I cannot at all understand. Dr. Stewart removes the cementum and the pericementum from the tooth entirely. There is no bone around the tooth, as I understand it, and still he has a reproduction there, and makes these grooves for the purpose of lodgment of bone. Somewhere in this line of argument there is a mistake. He makes these grooves for the deposit of bone, but where is this bone coming from after the periosteum is removed? He has not told us how many of these cases he has treated. We have no statistics at all, only this one case, and one swallow does not make a summer.

Dr. MILLS. That is the kind of case that I call an ideal case of pyorrhea, and it is a class of cases I have never been able to succeed with, although I have had absolute success with other classes.

Dr. STEWART. I think I have been somewhat misunderstood, especially by Dr. Hill. I will say in the beginning that I am almost overwhelmed by the kindness and consideration with which this paper has been received. I admit that at first, being a country dentist, from a little country town, I felt somewhat embarrassed to address you, who are supposed to be the brainiest and most august dental body of the world. I have found you the most liberal set of men I have ever met.

Three years ago I read a paper before the Mississippi Dental Association. I was not a stranger among them, as I am among you. My views were received with incredulity, almost derision. At that association most of them (one gentleman especially) pronounced my whole treatment as utterly absurd and unreasonable, and he dwelt particularly upon that part where I remove the pulp. After that I found that that was the practice of several men in this very society. He was a professor in an Atlanta dental college. He said the idea was perfectly absurd.

Dr. Rhein says that my treatment is unnecessarily severe. Doctor, may I ask you, when you treat your cases do you ever expect a return of the disease? In a majority of cases do you expect those teeth to be cured? In other words, do you cure the disease?

Dr. RHEIN. It depends upon each individual case, Dr. Stewart. There are some cases I never expect to cure, and tell the patients they cannot be cured.

Dr. STEWART. You do not claim, then, doctor, that your method cures pyorrhea absolutely?

Dr. RHEIN. The only answer I can make to that is that each case of pyorrhea must be treated according to what form of pyorrhea it is, and the nature of the patient. It is absurd to say that you can take pyorrhea and treat it irrespective of the conditions and the causes that exist. I cannot give any more direct answer. There are conditions that you can only alleviate, and there are conditions that are liable to recur, maybe not in that tooth, but in another tooth, in case the original cause should again be so predominant as to cause a condition of that kind to arise.

Dr. STEWART. Dr. Rhein, and also Dr. Hill, say that the periosteum is entirely removed in my operation. I never made any such claim or statement. I never claimed to go below healthy alveolar bone, except in making the grooves for a redeposition of bone.

Dr. RHEIN. Did I not understand Dr. Stewart to say that he goes to the end of the root?

Dr. STEWART. Oh, no.

Dr. RHEIN. In that case, then, I cannot see anything too severe in the operation, if I have misunderstood in that respect.

Dr. STEWART. I only claim to go to healthy alveolar bone. If there was no alveolar bone until you got beyond the end of the base, how could there be any tooth there? Dr. Hill speaks of my removing all of the cementum, clear up to the end of the root. How absurd it is to think of taking an instrument and going to the end of the root, leaving nothing around it. Before the operation was finished the tooth would have dropped from its socket.

Dr. Rhein speaks of exostosis; says that it requires no microscopical observation to ascertain that it is hypercalcification of the cementum. He probably could not have given a better support to my theory than this one of exostosis. We claim that it is the density of the cementum, not the amount. According to Dr. Rhein, the larger the tooth the more apt it would be to have Riggs's disease. We claim that it is the density of the cementum, not the size of it. In exostosis it is less dense, and the periosteum the better nourishes it.

Dr. J. Bond Littig. You claim a greater density, don't you?

Dr. Stewart. The lacunæ and canaliculi are partially or wholly obliterated, and the specimens show that this is chiefly in the external layer; our object is to get that external layer removed and to re-establish connection.

Dr. Hill. Do you claim that the alveolar process is not affected by this?

Dr. Stewart. I claim that it is affected. I use pure hydrochloric or sulfuric acid. Dr. Riggs and Dr. Atkinson, I think, used the aromatic sulfuric; I do not think that is strong enough. I do not use this acid for its effect on the soft tissues, but on the bony tissue, where the canals have been partially filled up. I use five per cent. within the canal. When I want the acid diffused throughout the tooth I seal a five per cent. solution up in the canal.

Dr. Hill. Is it not a well-established fact that a five per cent. solution of sulfuric acid will have no effect at all,—that within a minute, the way we use it, the lime there will neutralize it? A twenty per cent. solution of sulfuric acid will not affect a good, healthy tooth.

Dr. Stewart. Dr. Hill seems to think I am either trying to dig the tooth out of its socket by instrumentation or dissolve it out by medication. In either case the disease would undoubtedly be cured.

I depend, as I said, on the diffusion of the acid throughout the tooth. I am not trying to break down the lime-salts. Of course the five per cent. solution will soon be neutralized and will not to any appreciable extent affect the strength of the tooth. It is for this very reason that I use it.

As I said in the beginning, I do not claim to have presented this subject in a very scientific way. I only know that I have gotten results that exceeded my most sanguine expectations, and I give it to you to do with as you see fit.

Adjournment.

W. J. Turner, M.D., D.D.S.,
Editor New York Odontological Society.

AMERICAN DENTAL SOCIETY OF EUROPE.

(Concluded from page 585.)

THE CHAIRMAN. We will now proceed with Dr. Chas. Luce's paper on

THE PRACTICAL USE OF GOLD AND TIN IN COMBINATION.

DR. LUCE. Mr. President and gentlemen, it is with some misgivings that I take up an old and hackneyed subject, and I should hesitate to express my convictions were it not that so many favorable opinions have been given from time to time regarding the saving properties of gold and tin in combination. A peculiar fact in this connection is that, notwithstanding its adaptability for tooth fillings, except as a necessary component of amalgam it is very little used. The very men who express extravagant praise of its merits often use but little themselves, and the dental depots report that the sale of tin foil for tooth-filling is exceedingly small. The principal objections to the use of tin are its color and softness; its advantages are its ease of adaptation to the cavity-walls, non-conducting properties, and possible antiseptic influence, all of which are of prime importance in tooth-conservation. The objection to color is at once removed if we keep the tin out of sight in the finished filling, which should present only a well-polished gold surface. As to the softness of tin, I am led to believe that this metal undergoes a slow process of crystallization in the mouth, eventually becoming hard and homogeneous. This property of softness is a real virtue, inasmuch as it permits close adaptation to the cavity-walls; it renders the use of tin practical, and we must so manipulate it that we may take advantage of its softness and be able to weld on a hard, resistive surface of gold. I have tried to work tin in several ways, and I am now using a method which has proved to be quite satisfactory and practical, inasmuch as it permits quick work and good results.

My method is, briefly, as follows: A sheet of No. 2 tin foil is rolled into a long rope and laid aside; one-quarter of a sheet of No. 4 cohesive gold foil is smoothly placed upon a mica plate and evenly annealed, the rope of tin is carefully laid upon the strip of gold, and with due care the gold is rolled and welded around the tin core. Our rope of tin is now surrounded by a coat of cohesive gold, and when cut into pellets of suitable sizes may be manipulated with facility and rapidity, at the same time securing accurate adaptation to the cavity-walls. All exposed surfaces may be covered with the desired thickness of gold, thereby preventing discoloration and pitting. In coronal cavities the tin must be entirely covered, but approximal cavities may be so filled as to present a line of tin at the cervical border.

In designating the proper manipulation of cohesive gold-tin, certain points are to be remembered. Fine or coarsely serrated points should be avoided, except for forcing the first pieces of cohesive gold into the surface of the condensed gold-tin. This is not absolutely necessary, as the condensed gold-tin has a cohesive surface, except after continued condensation, in which case the gold seems to be driven into the filling, the tin coming to the surface. Cutting the first pieces of cohesive gold into the condensed gold-tin with fine or coarsely serrated points may, however, be recommended as an added measure of safety. The plugger points suitable for the crystal golds are peculiarly adapted to condensing this form of gold and tin. Firm hand-pressure is preferable to any form of malleting.

In filling simple coronal cavities the procedure is as follows: The rope of tin, with its envelope of cohesive gold, is cut into suitable pellets, and a sufficient number are inserted into the cavity to well cover the bottom and walls. With good-sized pluggers the gold-tin must be accurately adapted to the cavity-walls. If we have inserted too little at the start our filling will rock, under which condition it would naturally be necessary to remove all and begin again. If we insert too much the tin will crop out at places in the finished filling, and after some weeks' time will present a black appearance. Having condensed the first pellets, others may be added, one at a time, until the desired quantity has been inserted and condensed, but care should be taken that the gold-tin does not overlap the cavity-borders.

The next step is the application of the cohesive gold surface. As previously stated, the first pieces may be cut or punctured into the condensed gold-tin surface, but usually the gold will cohere without this measure. I use solila next the gold-tin on account of its cohesion and ease of adaptability. and the filling may be then finished with any form of cohesive gold.

For corono-approximal cavities in bicuspids and molars, I think this method particularly good; I always use the matrix, which I consider, intelligently used, to be almost an absolute necessity. I will not enter into any discussion of matrices in general, for that is too large a subject; sufficient to say that each operator should use the particular form of matrix with which he can get the best results.

With the matrix in position we have a simple cavity, but with one wall which must have a surface of gold built against it. I do not believe in too much pressure against the matrix. I prefer to use a smooth-sided point and manipulate the gold against the matrix by a rubbing or burnishing motion, giving great care to the angles formed by matrix and cavity-borders. The constant endeavor must be to adapt the gold-tin to the cavity-wall and away from the matrix.

The point may be raised that it is a disadvantage to have a layer of gold interposed between the tin and the cavity-wall, assuming that the tin cannot be so well adapted to the irregularities of the cavity; also that we lose the possible antiseptic effect of the tin in contact with tooth-substance. This is largely theoretical; the infinitesimal thickness of gold cannot possibly prevent accurate adaptation.

This method is not presented with a view to universal application, but rather for that variety of cases in which the resistive capacity of the tooth is low; or for those cavities which are so placed that the integrity of the filling is peculiarly taxed, as in corono-approximal cavities of bicuspids and molars.

Discussion.

Dr. BRYAN. I should just like to ask Dr. Jenkins and others who have used gold-tin all these years whether there is any wasting away of the tin at the surface. I have heard that with gold-tin, if there is a much larger quantity of gold than tin exposed, that is, the cohesive surface of the gold above the tin being larger than the tin, the tin will dissolve away. Have any members experienced that trouble? I have not myself used it long enough to know that.

Dr. ABBOT. I think that is due to insufficient packing. I have never seen such a case.

Dr. JENKINS. All who have followed the process know that there is a curious molecular change; there is a curious action that converts the tin into an oxid, and in that process the surface becomes roughened. Whoever has used tin and gold finds that the solidity of the filling, sometimes in the course of a few weeks, invariably in the course of a few months, is enormously increased; it becomes hard, and sometimes, where insufficient gold is united with it, or where there is no pure gold used in finishing the filling, it is mistaken for amalgam. Only a little while ago I had a communication from Germany asking how these amalgams were made. The most beautiful and most perfect operations in tin and gold are those where the surface is made principally of gold in one form or another. There is no advantage whatever, so far as I know, but some disadvantage in the use of cohesive gold with tin. It has to be packed by lateral pressure. All tin and gold filling should be packed by lateral pressure, and there is no advantage in using cohesive gold for that purpose; and in my opinion it is far more desirable to use non-cohesive gold. If one wishes to finish with gold foil, then it is necessary to proceed as if one had an entirely original cavity in the middle of the filling, and not to depend upon the cohesion to the tin.

Dr. DABOLL. I should like to ask Dr. Abbot whether he knows or remembers the exact proportion of gold and tin that his father used in his work. Twenty years ago one of his patients came to me suffering from an inflammation of the mouth, and I found what I supposed to be an amalgam filling in the teeth. That filling had a surface that was polished, and the appearance of the filling was that of gun-metal. It was beautifully polished, beautifully finished; and, as I wanted to go through the filling into the pulp-chamber, I undertook to drill through it, and I thought to myself I never had struck such an amalgam. It took half an hour to get through that filling. It was the best thing of the kind I had ever seen. I quite intended to write and ask Dr. Abbot what amalgam that was, and I should very much like to know what were the proportions of gold and tin. That filling had been in the mouth for ten years.

Dr. ABBOT. As I remember, my father used half and half; half gold and half tin. This process of crystallization is undeniable.

I am sure that filling was not as hard when he put it in as it was when you saw it. Perhaps that is what Dr. Bryan meant, the roughened surface was due to the crystallization.

Dr. L. A. O'Brian. In regard to tin and gold fillings, I take my tin and gold, when I use them, half and half, roll it into ropes, cut it in cylinders, and pack it into a tooth as I would pack in soft gold. Now I leave a great excess above the cavity—I am speaking particularly of a crown cavity in a molar tooth. After I have done that, and got in all I can, I use an engine burnisher and grind it down, and I must say I do not find any surfaces which look ugly or like amalgam. They look more like something between gold and bronze, as Dr. Daboll says; and I think a person who covers up a tin and gold filling entirely with cohesive gold, as I know a great many operators do, defeats the very object which tin and gold are intended to accomplish. In that case one might just as well use soft gold. I must say I have quite as good success, and perhaps am a little more gratified, when I have made a filling of soft gold in that way. In cases where the patient would be liable to complain of any change of color, that is obviated. Soft gold, I think, could be worked to quite as good advantage.

Dr. K. A. Davenport. I think Dr. Luce has introduced a novel idea, and one that will settle the question of the great value of tin; and in this paper he has illustrated the use of tin in a way that has never been used before. We have always considered that the fact of the tin coming next the wall of the cavity is the important part, and I have a feeling that Dr. Luce's having introduced the tin in this manner with the gold will disprove this. Of course, it is hypothesis. I am quite of opinion that it is not the question of the tin coming next the cavity that does the work, but it is the absolute adaptability of the filling. And here he has introduced a method where the tin cannot come against the cavity; this makes the paper one of the most interesting that I have heard for some time.

Dr. W. Mitchell. There is one item that has occurred to me in connection with this which it strikes me will be well to notice. Dr. Luce says an external wrapper of cohesive foil which has been annealed. It will be interesting to follow this case and to see how time affects it, for the reason we know that a soft gold foil filling saves a tooth nicely, and whereas a filling of cohesive foil would not have the same result as soft foil used in connection with tin.

Dr. Luce. I think the gentlemen are laboring under a mistake when they say I use much gold. The quantity is small; it is only to make it sticky in the compression of the gold-tin in this form. The gold absolutely disappears after a few prods with the instrument. The gold is forced in, but still there is enough cohesive property of the gold left, so that the mixed pellet will stick and you get a complete adaptation. It is not so much to make a combination of gold and tin as to make the tin sticky. You get an indestructible polished surface; that is the simple statement.

Dr. L. A. O'Brian. Pure tin is cohesive.

Dr. Luce. If you shave it, it will be pure shaving. If you put a rod of tin in a lathe and turn it up, it is cohesive, but not if you take it from the book.

Dr. W. A. Spring. It seems to me that Dr. Luce has introduced an idea which will be of positive value to us. I welcome anything that will advance the use of tin and gold. This may prove of value, in that it will provide a method which may be used by many who do not use the non-cohesive method of introducing foils. There are a great many who do not do it. I think that is one of the things that has prevented a more general use of tin and gold. Personally, I think one of the greatest advantages of tin and gold is the rapidity of insertion, because it is introduced in a non-cohesive method. One idea about the color. I am using now six parts of gold to one of tin, rolling it with the tin in the center; and when that filling is finished, and then polished with pumice on a point of leather, the tin seems to be so polished out as to leave a very golden surface; and the color of that filling is quite satisfactory. It is not so beautiful as a pure gold filling, but it is very satisfactory; and it has been introduced very rapidly, in that it is done with the wedge process.

Dr. Sachs. I won't say much about the manipulation of tin and gold. I only want to say this, that for twenty years Drs. Abbot, Miller, and a few others have recommended gold and tin as the best material, except gutta-percha, for preserving teeth. I cannot say for more than twenty years. If one watches the cases that come under one's notice in the course of twenty years, one naturally comes to the conclusion that what he sees is either good or bad. I came to the conclusion that it was good. I see a good many patients treated by dentists from all parts of the world, but I only find those who come from Drs. Jenkins, Abbot, Miller, Page, and a few others with tin and gold in their mouths. I have asked some dentists why they do not use it, and they often say, "If we put in tin and gold the patients think they get materials of less value and pay the same for them." Well, if that is the reason, we should tell them.

Dr. Daboll then read his paper, as follows:

The Automatic Mallet.

The most formidable obstacle to success for the embryo dentist is the difficulty of acquiring the art of properly condensing gold in cavities of decay in the teeth, to the end that a recurrence of the caries shall be prevented. It is probably safe to say that half of the men who enter the profession of dentistry never attain mediocrity, and but a small percentage of the other half reach superior excellence. To the end that the highest standard should be attained, it is unquestionable that instruments, as well as material, play a most important part. Always supposing that the man has the vocation, the taste, the ambition, and the will, he must have the proper accessories to produce the best results.

It is about forty years since the mallet was first recognized as a factor in condensing gold in cavities of the teeth, making its advent about the time of, and probably owing its introduction to, the discovery of cohesive gold, which latter, changing as it did the art of gold filling by the wonderful possibilities it brought with it, created the necessity of new forms, new instruments, and new methods.

The profession owes to the late Dr. Atkinson, more than to any other man, the promulgation of the principle of condensing gold by percussion. With his usual enthusiasm he carried his ideas to the extreme limit, and met with much opposition. Despite all, the practice rapidly gained adherents, and it was but a brief period before many of the best men in the profession were "malleting," but with medium weights as compared with the "heavy lead" advocated by Dr. Atkinson. The inconvenience of the hand mallet, if used by the operator himself, and otherwise the necessity of employing another person to wield the instrument, stimulated the inventive faculty, and early in the 60's two so-called automatic mallets were brought to the notice of the dental profession. They were the Snow & Lewis, of Buffalo, N. Y., and the Salmon, of Boston, the inventors all being dentists in actual practice. The recognition and introduction of these instruments were comparatively slow, which may be attributed to the lack of the faculty of "adaptation" in most men of the "means to the end," the failure to comprehend the mechanism, and the limitation of its use as related to the gold and the tooth-structure, resulting in its being abandoned by many after a brief trial, to be taken up again after comparing notes with the fortunate ones who had succeeded in mastering its use. Of the merits of the two mallets no comparison is intended, many failing to detect any marked superiority in either; but it is safe to say both were practical and effective, and have proved equally valuable in the hands of many of our most distinguished operators. As years advanced several other mallets were brought out, and the electric, the pneumatic, and the engine mallet, the Bonwill, were added to the list; all good, but, being more complicated, have, in comparison with the simpler instruments, been adopted by but few. That good results can be attained with any and all of them, varying only with the ability and individuality of the operator, no one, I think, will dispute; and it is only in the general adaptation, efficiency, and simplicity that superiority for any system can be claimed.

This paper being devoted to the consideration of the automatic mallet, no comparison will be instituted with the electric, pneumatic, and engine mallets, only as it may come in in a general way. I proposed to record the convictions resulting from thirty years' experience, and, if possible, to combat successfully the objections that have been raised by the advocates and inventors of the other systems.

There are those to-day who aver that cavities cannot be properly filled with gold by the aid of the automatic mallet; that the percussion resulting from the blow is not of the same character and not as effective as that of the hand mallet. It is also objected that the force of the blow being in a direct line with the axis of the instrument, no lateral effect can be obtained. Third, it is objected that the blow is too sharp and painful for the comfort of the patient and safety of the enamel; that delicate teeth with thin enamel-walls will not admit of its use. Fourth, that it is not sufficiently delicate in its form to admit of packing gold to fine, clean margins. Fifth, that gold cannot be condensed rapidly by it. Sixth, that patients object to its use as being extremely unpleasant and disagreeable. Seventh, the minor complaints that it was complicated and got out of order easily.

I might go on to a score, but it is enough to say that one and all of these criticisms vanished into air under the light of time and experience; and I make the assertion, first, that the blow, if properly regulated, is not painful or sharp, always premising that the parts are sufficiently lubricated and in good working order. In the early years of the manufacture of this instrument it was my fortune to be intimate with the inventors of it, and at their factory I have seen instruments returned as being out of order that were immediately made effective by a few drops of oil; others were returned in pieces, the dentist having recognized the necessity for oil but being unable to put the working parts in their proper places after its application.

The first care of every operator should be to thoroughly master and understand the mechanism of every appliance he uses, to the end that he may with the least delay comprehend and correct any fault in its action.

Gold can be as thoroughly condensed with the automatic mallet as by any other. It is simply a matter of correctly shaped points and the proper weight of the blow. It is very easy to overdo. Some years ago I read an article on "Over-Malleting," in which the writer called attention to the fact that many operators malleted the gold until the integrity of the metal was destroyed. It is quite possible, for many go to extremes, continuing to add heavy blows long after the gold has become as dense as it is possible to make it. Want of intelligence and observation is the explanation. To the trained ear and hand the *sound* of the blow and feel of the instrument is a sufficient indication of the correct degree of density. The danger to frail walls and thin enamel is obviated by delicate manipulation and light blows, but there must be sufficient force to consolidate the gold; to that end small pellets must be used, and at no time should the force be applied at right angles with the surface of the enamel, the point of the instrument being held at an oblique angle, relieving the enamel from the full impact of the blow and yet thoroughly packing the gold against its surface. Cavities in which portions of the enamel are denuded of its backing of dentin can be successfully and more safely filled with the automatic mallet than by hand-pressure. The writer recently saw five large fillings in some central incisors made six years ago with the automatic mallet, every one in perfect condition, and the gold distinctly showing through the labial aspect of the teeth. Gold can be packed to the marginal finish of the cavity perfectly, without injury to the edges of the enamel, if the operator will steady the plugger point by making for it a rest with the thumb or forefinger of the left hand. This is really essential at all stages of the filling, as it gives facility, certainty, and steadiness, and permits a rapidity of stroke otherwise not safely attainable. In large cavities in molars and bicuspids, rapid condensation of gold is desirable where time is a factor; and, as it usually is to men in large and full practice, this mallet will be found as quick and thorough as any other. It is not a complicated machine; on the contrary, is very simple, and one may literally say it never breaks down and never wears out. It is easily regulated; that is to say, the weight of the stroke may be made lighter or heavier, and graduated with certainty. The blow has a proximate range of power from zero to ten foot pounds, and it is important to know that one should never employ the maximum. A blow the percussion of which would be equal to raising a weight of three pounds will be found quite sufficient for the purposes of condensation with medium-sized points and small pieces of gold. One naturally comprehends that with broad, foot-shaped points the tension must be increased; likewise in condensing large masses of gold, and at the finish of the surface of a filling; but at no period of the operation would it be necessary to use a force of more than five foot pounds. For greater facility and economy of time one should always employ at least five instruments; ten is still better, while twelve or fifteen will be found in practice to be the greater economy. With these there ought to be a choice of forty or fifty points of all the shapes and sizes, including those especially adapted for matrix work, which require a special form. With a dozen pluggers with rubber bands of different colors on them, that one at a glance may select a desired point without being obliged to search for it critically, with an assistant to anneal the gold and feed it to the cavity, the operator is enabled to proceed with the condensation with as great rapidity as is commensurate with the comfort of the patient and the assurance of the result. The selection of points for an operation naturally depends on the size and location of the cavity, and the importance of having a large number is that the operator may not be embarrassed in a choice of forms suitable for the operation in hand. The greatest utility of the mallet depends on this. With the novice, one mallet will avail to secure a knowledge of the capacity of the instrument, but with the advance of his acquaintance with its advantages he should add to the number until he has at least enough that he may not lose valuable time in stopping to change points. In early days the cost of the plugger—I think as high as twenty dollars—was often a bar to many who felt that they could not afford the price; but at the present day, when they can be had at a maximum of five dollars, there exists little reason, from a money point of view, for their absence from the dental cabinet in any desired quantity.

The use of the automatic mallet should be taught in the schools. Every demonstrator should be skilled in its management, and, regardless of any predilection for other mallets, should give the student the opportunity to verify its merits and advantages and make his choice.

Again, it is not well to employ a variety of mallets. He who does is not likely to attain the skill desired for any one system. Only by the constant use of one kind will the operator gain a perfect knowledge of its possibilities, as well as its limitations. And, this admitted, it may at once be seen how important it is for the young dentist to make the correct choice at the outset of his career.

In mentioning the different automatic mallets I have inadvertently omitted the Abbott mallet, the device of the late lamented Dr. Frank Abbott, of New York. This mallet varies from the Snow & Lewis and the Salmon in being a double-ender; that is, having a back action, enabling the operator to condense gold in cavities on the posterior surfaces of the molars without making access through the grinding-surfaces. To the writer this variation has always been of doubtful utility, and only having the effect of making the instrument clumsy.

There is also the Bosworth automatic mallet, in two forms—direct action and nearly right angle. It can be conceived that the angle mallet would meet a want, in enabling the operator to condense gold in situations inaccessible to the direct-action instrument.

SEVENTH DISTRICT DENTAL SOCIETY, STATE OF NEW YORK.

(Continued from page 576.)

DR. L. W. SIBLEY, of Rochester, read the following paper:

THE NECESSITY FOR DENTAL SURGEONS IN THE ARMY AND NAVY.

Our late war with Spain, with its far-reaching complications, has brought to the minds of our people the necessity of better equipment and more thorough organization for the care and protection of our army and navy. Heretofore our soldiers have been within the reach of the necessities of civilization at all times; now they are in semi-civilized islands, among a people who know little of our manners and customs, with pay that is entirely inadequate to secure for them the comforts and necessities that are not provided by the Government.

The one problem that appeals to us is the entire absence of means furnished by the Government for the care and preservation of the teeth, those organs which are so necessary to the comfort, health, and well-being of the individual.

All classes of society, from the humblest laborer to the man of most abundant means, recognize the great necessity of caring for these organs which nature has given them, and avail themselves of the services of the dental surgeon.

At present the Government makes no provision for dental services other than the extraction of teeth. This operation, I am told, is usually performed by the hospital steward, who numbers among his other accomplishments the washing of bottles, doing up of medicines, etc. If the reports of our soldiers returning from Cuba are to be credited, life in the trenches dodging Mauser bullets is a glorious crimson sunset compared to a few minutes with this amateur dentist.

The idea of a regimental dental surgeon is not a new one, the subject having been agitated considerably of late, and seems to meet the approval of many of our prominent public men in this and other countries. I regret that the time given to the preparation of this paper has been so limited as not to admit of some correspondence with men prominent in army and medical circles. However, this paper does not pretend to be a treatise upon the subject, but simply aims to bring the matter to your attention and stimulate discussion.

This wealthy and humane country of ours has felt its great heart touched by the downtrodden and suffering people who have felt the yoke of medieval oppression, and have hastened to their relief at the expense of vast sums of money and the best blood that our country afforded. We are rescuing them from filth and ignorance, and giving them the benefit of humane laws and encouraging them to return to peaceful pursuits.

We cannot consistently be blind to the necessities of the men by whose instrumentality this great change is being wrought.

We are granting to the inmates of some of our prisons the services of a dental surgeon at the expense of the state, and are withholding them from our boys who are to-day fighting under a tropical sun for the honor and dignity of our flag.

It is an old proverb that charity begins at home. Many of these young men, inspired by patriotism, have left lucrative positions to face danger and hardship in our new possessions. If they need dental services they are at the mercy of the dentist of that locality, who is high-priced and of questionable skill. While we may envy the man who charges five dollars for extracting a tooth, we find ourselves filled with wonder as to how the trooper of Uncle Sam can avail himself of the services of this dentist if his prices for other operations are correspondingly high. But the extracting and filling of teeth is not all that is required. When the troops are in the field there are fractured jaws and innumerable other injuries that come within the scope of oral surgery.

It may be argued that the regimental surgeon attends to these cases, but the dentist has a special training to care for them, and is expected to possess more skill in this direction than the general medical practitioner. In view of these facts, it is the opinion of the writer that there should be a dental surgeon with every regiment, whose duty it should be to do the dental surgery of the regiment, and be under the direction of and take orders from the chief dental surgeon of the army and navy; and should be independent of the medical department. This is not to be construed that the dental surgeon should withhold whatever assistance he might be able to give in time of action, but should be so arranged that there should be no conflict of authority between the two departments in the discharge of their duty.

As to rank and remuneration, they should be the same as the medical officer, as it requires the same preliminary education, course in college, expense, and, may I add with pardonable pride for our profession, the same intellectual energy.

As the years go by there is less friction between the medical and dental professions, and we are beginning to recognize how much more good can be accomplished by working in harmony for the alleviation of pain and disease.

No one appreciates more thoroughly than we how scant the praise is for the surgeon who follows in the rear of the army, braving dangers and working unceasingly; often with only the reward of the sweet consciousness of duty well performed.

Discussion.

Dr. FRANK FRENCH, Rochester, said the subject of the necessity of dentists in the army was not a new one. Some twenty years ago it was discussed by Dr. B. T. Whitney, of Buffalo, with the idea of seeking dental legislation. It was again brought up two years ago at the meeting in Buffalo, and within the last two weeks an article appeared in one of our daily papers by an American dentist, setting forth some of the needs for dentists in the army, and saying that the author was then on his way to Washington to lay the matter before the authorities and modestly to ask for his appointment as dental surgeon-general of the army of the United States.

During our war with Spain the suffering of our soldiers from dental troubles was fearful, but there was no help for it. The fees of local dentists (where there were any) were far beyond their reach, such as five dollars for extraction, and other things in proportion. So the poor soldiers had to grin and bear it, or more probably grill and damn it. This might all, or at least to a great extent, have been obviated had there been army dentists.

The proposal of those who are moving in this matter is that the dentist should have the same rank and pay as the surgeon, which is the rank of major with pay at $2400 per annum, three rooms furnished, and forage for two horses. Of course, this entails a big expense to the Government, and would furnish very pleasant positions for our ambitious young dentists. It will doubtless all come in the onward march of events, but it must be carefully and wisely managed or it will be used politically. The dental service should be a part of the army, under the same rules and restrictions as the army surgeons. Under such conditions and with such teaching and discipline as the army gives, the army dentist would become a powerful adjunct to the army surgeon.

Dr. A. OSGOOD, Bath, said he had charge of dental treatment at the soldiers' home at Bath, and was often spoken to of the need of dental service to the army. There was a general feeling among the officers especially that a good dentist should be attached to every regiment.

Dr. B. T. HERT, Rochester, said there had been a committee appointed by the National Dental Association to do what was necessary to bring about the appointment of dental surgeons to the army, and he thought it would be as well for dental societies through the country to wait the outcome of the efforts of this committee rather than to form other committees on the same labor.

Dr. GRAHAM A. ANDREWS, Lyons, N. Y., read the following paper:

Discipline in Office and College.

It is becoming generally recognized to-day that the young man who contemplates studying for a profession should be well grounded in a scholastic training. Even in the trades there is this demand for the most thorough preparation, the striving for the highest attainments, as witness the establishment of schools for manual training in a number of the educational centers of our country.

Many of our most worthy members of the profession of dentistry have not a college degree, but the time has come when every prospective student of dentistry should fill his mind with the very best which a college curriculum affords; and certainly no man should think of commencing the study until he has finished an academic course.

Every young man who chooses dentistry as his vocation and has the privilege of putting himself in touch with the experiences of a dental surgeon in an office, and finds that he is really in harmony with the study and work, has made a good beginning.

A student of law believes it to his advantage to pursue part of his course in the office. Here he has the privilege of gaining some experience in the practical, as well as absorbing some of the theoretical. In our dental institutions of course the student has the opportunity in a limited way of applying his knowledge, but the man whose only preceptor has been the college finds a new world to conquer when he pushes his bark into the public stream; and while he may know the color, shape, and use of a buoy, how about those hidden reefs which are sometimes unmarked, and which tax to the uttermost the energies of the experienced pilot?

Not every man can be an artist or a sculptor. There are bright men who are eloquent with tongue and pen, but it does not follow by any means that a trained mind which can concentrate thought and put power into language can achieve success as an artisan. The world knows of but few notable exceptions to this rule. Now, if there be a natural liking for painting or drawing or cutting with chisel, a quick eye to discern the beauty and artistic work which lies in a masterpiece, the chances for success in dentistry are certainly encouraging, and mind and muscle training may go hand in hand.

I wish to emphasize in particular this point, which is so potential a factor in dentistry, a profession which demands the skilled hand as well as the trained mind.

If the dental operator *sees* and is in harmony with that which is beautiful in nature and the exquisite workmanship which the human mind and educated hand have produced, there will be a vital, energizing power entering into his work which will aid him immeasurably in being "a workman that needeth not to be ashamed."

Personal observations of specimens of dental workmanship lead me to testify to the fact that there are men who are, to say the least, indifferent dentists, who might have attained a high standard of efficiency in some other calling.

The student in the office, even though his course of tuition be a brief one, may grasp much which will be of considerable aid in his college life, and even beyond, when settled in business for himself. He has now entered upon the training of those mighty agencies, the eye and hand, and they are to assist in mind-building. He should realize from the first the importance of muscle-training.

Of course, he must become acquainted at once with the names of the instruments and tools, be given the privilege of seeing them used, and as quickly as possible be allowed a chance for "self activity." He should now bend every energy to the cultivation of his artistic sense. The office, in a measure, may be likened to a preliminary school, and before leaving for college the student should familiarize himself as far as possible with dental anatomy, terminology, the appliances and general paraphernalia which are necessary equipments of a dental office.

Thomas Carlyle, in his address to the Edinburgh students, observed that "it is the first of all problems for a man to find out what kind of work he is to do in this universe."

Our dental student having settled this problem, being aided in doing the same by an office pupilage, makes a marked step in his career when he enters upon that fuller, deeper, and inspiring period in his life, the college course. He is certainly better prepared to take up the new duties, enters upon his work with a far more intelligent idea of his environment, than the man who enters without any previous training. He is there to see, think, and work, and will gain in knowledge and experience just in proportion as he realizes the significance and puts into action these three cardinal principles.

It is said that Correggio was inspired to persevere and do his best by seeing Raphael's "St. Cecilia." Is it not true that artistic work by a brother classman, work that is worthy of credit, that brings commendation from professor and fellow-students, aids and inspires more than is sometimes realized? Much of that which is worth knowing is ofttimes in a measure hidden, and to the detriment of the learner, owing to the untrained, if you will, dwarfed perceptive faculties. Who but the keen observer is going to get a correct idea of color or form? By all means, then, there ought to be a deep realization of the importance of sight power and an endeavor to educate and develop it to the fullest extent. In the lecture-room, while there will be much that will appeal to the ear, and one must needs be a good hearer, the seeing eye will carry to the thought centers knowledge which would have been far less impressive were this power which aids so materially in grasping facts not called into active service.

While the power to see, to observe, is of great value, to meditate, to think, is still more necessary.

Dentistry not only calls for dexterity in manipulative ability; while the student may justly strive to master and develop the most subtle energies which lie in the motor powers, he must exercise, yea educate, that important faculty, the judgment.

Our beloved and lamented Professor James E. Garretson used to say that "common sense is better than no sense, but what you want is educated sense." That which is assimilated builds up tissue. Knowing facts, thinking upon the same, and using the judgment in determining their proper use greatly increase the power for usefulness. A delicate case for medication presents itself. Realizing that there is a maximum and minimum degree in therapeutic treatment, and that surgical skill alone will not suffice, reason must keep the forces within the boundary line and determine the course of treatment. It takes thought sometimes to decide between bread pills and arsenic; that nature when left alone is a great alleviator of disease. In a word, then, to properly medicate, to preserve and restore, demands study and intelligent action.

Spencer says that "the best brain is found of little service if there be not enough vital energy to work it."

Occasionally there are students, bright fellows, who are well equipped with the vital energy, but who put too little force, push, if you will, into their efforts, often cheerfully allowing the other fellow to do their thinking, and in numerous ways rendering assistance. Indolence is an offense which will, if indulged for any length of time, dwarf manhood.

We all admire the worker. At the very beginning of the college course there should be manifested a decided interest toward the manual part of dentistry. Real, genuine effort to get acquainted with mechanical principles, to put the personality into some piece of work, though it be simple in character, is of the utmost importance.

The question of how and to what extent the energies are to be directed involves a point which demands the most careful consideration on the part of our teachers.

The wise student will early recognize the importance of habit. He should be taught to realize the absolute necessity of cleanliness, to be thorough, and that the majority of people will appreciate gentleness. He should acquire the habit of seeking acquaintance with the wisest and most experienced thinkers, of giving faithful attention to even the most minor parts of his training, for this will have much to do with his success when in active practice; and, above all else, linking conscience with judgment into each piece of work.

Discussion.

Dr. J. F. Knapp, Geneva. Much has been written and said upon the subject of raising the standard or qualification of admission to the practice of dentistry, and nothing that I have read or heard, to my mind, is better than the paper just given us by Dr. Andrews, for he lays equal importance upon muscle-training as upon mind-training.

I am one who does not believe in raising the literary standard higher than it is to-day, for it is now on the same level with medicine and law; and well it should be, but no higher. To give to muscle-training the same importance as mind-training, I would make it compulsory for the candidate to attend upon an office course under a reputable practitioner before entering upon the college course. I claim this to be as important as the college course itself, and should be at least two years in length. No college course will compensate for the instruction received in an office, for he will not have in college the ocular demonstration, the opportunity of doing as well as seeing, that this affords.

This would mean five years spent in the study of dentistry before being entitled to practice. To those who would make it obligatory that the candidate preparatory to this should have a scholastic education by holding a degree from such an institution, let me say that would mean at least four years more, or nine altogether; and if that standard had been put in force thirty or forty years ago it would have shut out the majority of the brightest lights the dental profession has known. For it is inconsistent with the opportunities of the majority of the men and women who are compelled to make their way, and I contend that among the most worthy members of the dental as well as any other profession are those who are compelled to make their way. Chauncey Depew said that the only man who had not been equaled up to the present day as an orator and scholar is Wendell Phillips, and Wendell Phillips said that the colleges were not, as generally supposed, storehouses of knowledge from which the student could draw, but, in fact, the graduate took from it little more than he brought, except the training of his faculties. He raised the question, "How would college-bred Seward weigh in any balance with Lincoln, bred of affairs?" He also quoted from Gibbon, who says we have two educations; one from teachers, and the other we give ourselves. This last is the real and only education of the masses; one gotten from life, from affairs, from earning one's bread, necessity the mother of invention, responsibility, that teaches prudence and inspires respect for right.

I am not trying to underestimate the value of a scholastic education, but it should not be indulged in to the neglect or sacrifice of muscle-training in the practice of dentistry. A few years ago Dr. Belcher, of this society, read a paper upon "The Dental Student." I wish to refer to that paper. He stated that the secretary of the state society found by the law of 1892, which obliged all entering the study of dentistry to register, that only about twelve per cent. of those registering were students under practitioners who are members of dental societies. This shows there is a responsibility resting upon all such dentists to take into their offices as students for mutual benefit many who present themselves. It is an open question who will be benefited the more, student or preceptor. A college professor said that it took only from three to five years for dental and medical students to forget all the anatomy they ever knew. That is not exactly true, but to quite an extent. The review work necessitated by the questions of the student will refresh the memory amazingly.

"She taught the child to read, and taught so well,
That she, herself, by teaching learned to spell."

I know of an instance where a dentist took a mere boy in his office, more as an office boy than a student, and the first work he gave him to do was to back some plate teeth with metal. Shortly after he had occasion to go into the laboratory, and glancing over the boy's shoulder saw him seated with the shoe-blacking on his knees; and with a match in one hand he blackened the ends of the pins, set the pins against the metal backing, and then knew just where to punch the holes by the little black dots. After that the dentist had a more accurate way of fitting his backings, but perhaps substituted some other material in the place of shoe-blacking.

I have not covered all the points in the paper of the essayist, but have consumed enough time. In conclusion, I wish to say the dentist who takes a course in a dental office preparatory to going to college will there be shown whether he is adapted to the practice of dentistry without "spending his time and substance" and the humility of defeat at the end of a college course, and to enter college after that preparation he will further pursue the study because of his love for it and because of that self-confidence begotten of doing, as well as seeing and hearing, and will gain the "Well done" of both preceptor and professor.

Dr. B. L. HERT, Rochester, thought the necessity of a student's training in a dental office very evident, but if it was to be compulsory it would be necessary to shorten the time spent at college, as the students could not well afford more time than is required now in fitting themselves for practice. Muscle-training is no less necessary than scholastic training; rather more necessary in the dental profession.

Dr. H. J. BURKHART, Batavia, said his views on the subject of preliminary education of dental students are well known. It is a fact often proven that those who have the advantage of training in a good office under a competent man before going to college make the best dentists. We are largely a mechanical profession, and must get the mechanical training; and to get it before entering on the collegiate course is the best time for many reasons. The question of making it compulsory is open to discussion.

Dr. W. C. WILBUR, Corning, said there was one thing requiring mention in this connection, and that was the difference of the value of the training a student would receive under different preceptors. A student who worked under a dentist who was behind the times and full of wrong notions would perhaps have his head filled with much that would require some time to unlearn before he could profit by the broader and more correct instruction he would receive in college. In fact, incorrect principles so acquired would possibly be a detriment to him through life.

Dr. PROSEUS said there was no doubt that a season spent in the office of a good dentist would be beneficial, but Professor Peirce said that he would prefer a student who did not know the difference between a spatula and an excavator to one from the average dental office. The trouble frequently is that the student feels that he already knows so much that he does not need to work in the college, and becomes careless and lazy, neglecting the opportunities for study and improvement, and being generally a detriment to the class. Beside this, in New York state the law forbids a student to attempt any operation in the mouth of a patient.

Dr. F. A. Greene, Geneva, thought that in a good office, with a good man, a student would learn much of value even if he did no work, and the time spent so would be of immense value to him in his college days.

Dr. Andrews, closing the discussion, said that a dentist who takes a student into his office and encourages him to take a college course should feel that there is much responsibility in such a course, and should inform himself as to the character, the history, the brain and finger power of the young man before he allows him to become a student. Unless there are certain indications of ability, and the love of mechanics, with a special desire both for study and constructive work, the young man would do better to follow some other line of work than dentistry.

The subject was passed, and Dr. J. N. Crouse, of Chicago, addressed the meeting on behalf of the Dental Protective Association; after which the society adjourned till evening.

(To be continued.)

DENTAL COLLEGE COMMENCEMENTS.

UNIVERSITY OF BUFFALO, DENTAL DEPARTMENT.

The seventh annual commencement exercises of the Department of Dentistry of the University of Buffalo were held in Music Hall, Buffalo, N. Y., on Tuesday evening, April 25, 1899.

An address was delivered by Rev. Henry Elliott Mott, D.D.

The degree of D.D.S. was conferred on the following graduates:

Frank Anderson	Canada.
Geo. M. Austin	New York.
Wm. G. Beaumont	Canada.
Chas. A. Bennett	New York.
Frank J. Biker	New York.
Michael C. Bradley	New York.
Wm. J. Burke	New York.
Duncan A. Cant	Canada.
Fred. W. Champlin	New York.
Chas. H. Churchill	New York.
Arthur B. Cobb	New York.
Frank W. Cook	New York.
Frederic S. Cox	New York.
Leon V. Cursons	New York.
Guy R. Danforth	New York.
Geo. E. Dougall	Canada.
John E. Dunn	New York.
Harry G. Fairfield	Canada.
Robt. J. Fletcher	New York.
Chas. J. Fraley	New York.
Chas. E. Gillam	New York.
Gladstone Goode	New York.
Bertrand O. Harmon	New York.
Chas. H. Hickelton	New York.
Abram Hoffman	New York.
Geo. L. Horton	New York.
Arthur F. Isham	Michigan.
Wm. D. Jacob	Canada.
Alfred O. Jerrett	Canada.
Arthur J. Jessel	New York.
Clement D. Kennedy	New York.
Burt Kinsella	New York.
Francis M. Lee	New York.
Wm. N. Leonard	New York.
Harry H. Luton	Canada.
Harry K. Mason	New York.
R. G. W. Merkley	Canada.
Stanley A. Merkley	Canada.
John Middaugh	New York.
Geo. F. Mouthrop	Canada.
Mansfield E. Mooney	Canada.
Arthur B. Muir	Canada.
Emanuel Muntz	New York.
Daniel M. Murray	Canada.
Thos. F. O'Shea	New York.
George O'Leary	New York.
Fred'k W. Orwan	New York.
Herman E. Reynolds	New York.
Clare E. Robinson	New York.
Wm. J. Roche	New York.
Robert Sabin	Idaho.
Robert R. Schmidt	New York.
Grace N. Shirley, B.L.	Ohio.
Howard A. Smith	Canada.
Louis W. Smith	New York.
Alonzo W. Tracy	New York.
James F. Wardner	New York.
Wm. H. Willson	New York.

UNIVERSITY OF CALIFORNIA, COLLEGE OF DENTISTRY.

THE seventeenth annual commencement exercises of the College of Dentistry of the University of California were held at Berkeley, on Wednesday, May 17, 1899, at 10 o'clock A.M., conjointly with the commencement exercises of the Academic Department.

The degree of D.D.S. was conferred by Dr. Martin Kellogg, A.M., president of the university, upon the following graduates:

William R. Allin	California.
Ricardo Arroyo	Guatemala.
William R. Bacon	California.
Arthur W. Baker	California.
Joseph Barnett	New York.
Robert J. Blake	California.
Miss May Blossom	Nevada.
Walter J. Burridge	California.
Monroe N. Callender	California.
John A. Colegrove	California.
Miss Anna B. P. Croall	California.
Palmer H. Dunbar	California.
Norman S. Fairweather	California.
Cecil A. Fugler	California.
Lee R. Gambitz	California.
George W. Gove	California.
Frederick T. Grant	California.
Francis J. Gruss	California.
Benagah R. Hamlin	California.
Miss L. F. Herrmann	California.
Thomas R. Jones	California.
Charles F. Kuster	California.
William J. Lawson	Nevada.
George W. Likens	Nevada.
William H. Mayhew	California.
James B. F. Millar	California.
Edward M. Mulrenin	California.
Louis H. Parks	California.
Andrew D. Patterson	California.
Stephen L. Piper	California.
Wallace H. Renwick	California.
Charles L. Reich	California.
Joseph P. River	California.
Morris Schiller	California.
Thomas U. Smyth	California.
Stephen S. Southworth	California.
Abraham S. Sullivan	California.
Alonzo W. Tate	California.
Howard A. Tennyson	California.
Miss Rosa E. Turner	California.
Arthur H. Wanz	California.
Arthur L. White	California.
Edward O. Whitney	California.
John J. Williams	California.
William L. Warnekros	California.

MISSOURI DENTAL COLLEGE.

THE thirty-third annual commencement exercises of the Missouri Dental College (Dental Department of Washington University) were held at the Fourteenth Street Theater on Thursday evening, April 27, 1899.

The number of matriculates for the session was one hundred and thirteen.

The degree of D.M.D. was conferred upon the following graduates:

Elwood Alley	Missouri.
Henry C. Alloway	Missouri.
W. B. Arthur, M.D.	Missouri.
Roy Bay	Missouri.
Robert E. Black	Illinois.
Geo. W. Corder	Missouri.
Claudius G. Farrow	Arkansas.
Stonewall J. Ferguson	Missouri.
Henry R. Hoffman	Missouri.
Merle R. Hopkins	Illinois.
Porter Kendall	Missouri.
Herman M. Lansberg	Missouri.
Philip J. Lehnhard, Jr.	Missouri.
Chas. R. Mockbee	Missouri.
Henry C. Mueller	Illinois.
Sylvester C. Nifong	Missouri.
Clarence L. Sappington	Missouri.
Edw. Schlagenhauf	Illinois.
Alex. Scherzinger	Missouri.
Ira D. Scott	Missouri.
Hermann T. Spann	———
Henry G. Steinmesch	Missouri.
Chas. E. Stephens	Alabama.
Edwin W. B. Temm	Missouri.
Edw. W. Walker	Missouri.
Wilson R. Weber	Texas.
John H. Wild	Missouri.
Rudolph F. Wild	Missouri.
Raymond L. Willett	Iowa.
Eugene D. Wurtz	Illinois.

UNIVERSITY OF PENNSYLVANIA, DEPARTMENT OF DENTISTRY.

The one hundred and forty-third annual commencement exercises of the University of Pennsylvania were held in the American Academy of Music, Philadelphia, on Thursday, June 15, 1899.

The commencement address was delivered by Hampton L. Carson, Esq.

The number of matriculates for the session in the Department of Dentistry was five hundred and four.

The degree of D.D.S. was conferred by Charles C. Harrison, LL.D., provost of the university, upon the following graduates:

William E. Agnew	Canada.
Frederick W. Allen	Pennsylvania.
John H. V. Bache	New Jersey.
Harry C. Baker	Iowa.
Arthur D. Barber	Pennsylvania.
Walter W. Barton	Pennsylvania.
Andrew H. Baxter	Pennsylvania.
Willson E. Beattie	Pennsylvania.
Leon Berlau	Illinois.
Burton F. Bishop	Connecticut.
G. H. Bisseling	Holland.
James H. Black, Jr.	Pennsylvania.
Willy Blattmann	Germany.
Charles P. Blinn	Connecticut.
Edwin S. Bodle	New York.
Salvador Bravo	Nicaragua.
John A. Brooks	Pennsylvania.
Edw. P. Burnham	Delaware.
Roy A. Bush	Massachusetts.
Frederic H. Camp	Connecticut.
Harold Cardwell	England.
Eric A. C. Caro	New Zealand.
José L. Casalduc y Goicoechea	Porto Rico.
Clarence H. Chain	Pennsylvania.
Moon H. Chaun	China.
Frank W. Clinger	Pennsylvania.
Robert A. Comegys	Delaware.
William T. Conard	Pennsylvania.
Thomas J. Conlon	Massachusetts.
Audley B. Cook	Pennsylvania.
Albert W. Cowee	New York.
Arthur B. Crane	New Jersey.
H. B. Cressman	Pennsylvania.
Carl D. Crooks	Massachusetts.
James F. Cush	Pennsylvania.
L. W. Darlington	Pennsylvania.
Hardin Davis	New York.
Matthew T. Dill	Pennsylvania.
J. Warren Dilworth	Pennsylvania.
Dudley R. Dudley	Iowa.
Michael A. Duffy	Pennsylvania.
Harry Dunlop	Scotland.
Charles M. Dunne	New York.
Chauncey F. Egel	New Jersey.
Zacarias Esponda	Mexico.
George S. Essig	Pennsylvania.
Wilbur E. Evans	West Virginia.
Henry P. Feldman	Pennsylvania.
C. A. Fletcher	Massachusetts.
Chas. A. Forsbeck	Wisconsin.
John C. Forsyth	New Jersey.
John W. Freeston	Pennsylvania.
John K. Freiot	New York.
John G. Fulton	New York.
Francis X. Galen	Pennsylvania.
Alric Garland	Massachusetts.
John R. Gibbs, Jr.	New Jersey.
Regi'ld L. Gooding	Barbadoes.
George T. Gregg	Washington.
R. J. Haggarty	Pennsylvania.
Wm. N. Hartman	Canada.
F. H. Hartzell	Pennsylvania.
Edward J. Hayes	Massachusetts.
F. H. Hedden	New York.
A. W. Herrmann	Pennsylvania.
John E. Heyke	Connecticut.
Joseph G. Hickey	New York.
Henry L. Hillegas	Delaware.
Ernest E. Holland	Massachusetts.
Roy S. Howe	Massachusetts.
Richard O. Howie	New Brunswick.
H. O. Hutchins	Vermont.
Charles S. Jack	Pennsylvania.
William B. Jessen	Germany.
Wm. T. Johnston	Pennsylvania.
Lawrence H. Jones	New York.
Frank H. Kennedy	Massachusetts.
Marcus King	New York.
Frederick W. Knott	Iowa.
John B. Krebs	Pennsylvania.
R. Laberdesque	France.
Hiram H. Lane	Ohio.
James V. Langfitt	West Virginia.
Morris H. Leaver	New Jersey.
William C. Macy	Massachusetts.
Arthur R. Marks	Australia.
Harvey B. Marsh	Pennsylvania.
Julio R. Martinez	Ecuador.
Jos. M. McCarron	Pennsylvania.
John A. McClain	Oklahoma.
Chas. S. McCowen	Delaware.
Wm. F. McKinley	West Virginia.
Chas. T. McMurray	Massachusetts.
Karl Meisel	Germany.
Paul Mercier	Switzerland.
John J. Moffitt	Pennsylvania.
Arthur J. Moore	Pennsylvania.
William Morton	Australia.
Donald F. Mosher	Missouri.

Julius Müller	Germany.
Edward A. Newton	Oregon.
Joseph H. Noble	Pennsylvania.
Horace O'Bryon	Pennsylvania.
John J. O'Kane	West Virginia.
Samuel K. Owen	New York.
Francis L. Pache	Switzerland.
James D. Park, Jr.	Minnesota.
Maurice A. Perkins	Maine.
Charles J. Phelps	Canada.
Walter E. Probasco	New Jersey.
John A. Puckey	Pennsylvania.
Ralph I. Quay	Canada.
John J. Quirk	Pennsylvania.
H. D. Rawlings	Washington.
James W. Rawlings	Washington.
William B. Reilly	Pennsylvania.
Arthur H. Reynolds	Pennsylvania.
Charles S. Rice	Delaware.
N. B. Richards	Pennsylvania.
Hans A. Ringger	Switzerland.
Norman L. Roberts	Kansas.
Vernon D. Rood	New Jersey.
Oliver T. Rule	Connecticut.
Harry W. Ryman	New Jersey.
Albert E. Sager	New York.
Rhodin C. Scudder	California.
Joseph H. Shane	Pennsylvania.
Hermann L. Shape	Wisconsin.
Frank E. Shelden	Kansas.
Charles L. Siegler	Pennsylvania.
Theo. V. Smith, Jr.	New Jersey.
A. W. Stackhouse	Canada.
John A. Stafford	New York.
John P. Stanley	Maine.
Harry A. Stevens	California.
Roy R. Stimpson	Massachusetts.
H. A. Stoughton	Pennsylvania.
Benj. H. Stuckert	Pennsylvania.
Wm. R. Sutherland	Canada.
Ernst Taussig	Austria.
Richard P. Taylor	Georgia.
W. B. Tewksbury	Pennsylvania.
Harold S. Vaughan	New York.
Henry G. Vaughan	New York.
John L. Waechter	Pennsylvania.
Albert H. Wallace	New Jersey.
William R. Walter	Pennsylvania.
William J. Watters	Ohio.
Henry L. Weber	France.
Joseph A. Weinblit	Russia.
Charles A. Weston	Vermont.
Robert M. Wetzel	Switzerland.
Harry F. White	New York.
H. S. Williams	Connecticut.
Charles I. Winne	Connecticut.
William G. Wright	Pennsylvania.
Luthur A. Yeiser	Pennsylvania.
José S. Zamora	Nicaragua.

MEDICO-CHIRURGICAL COLLEGE OF PHILADELPHIA, DEPARTMENT OF DENTISTRY.

The Medico-Chirurgical College of Philadelphia held its annual commencement May 20, 1899, in the Academy of Music.

The doctorate oration was delivered by Professor Joseph M. Matthews, M.D., LL.D.; president of the American Medical Association.

The degree of D.D.S. was conferred on the following graduates by Professor Wm. L. Rodman, A.M., M.D.:

Robert C. Bain	Canada.
Jacob C. Bingel	Germany.
VanCola D. Burgess	Pennsylvania.
James M. Cornyn	Pennsylvania.
Emerson A. Dunbar	Louisiana.
C. M. Frantz, V.M.D.	Pennsylvania.
Condy C. Gallagher	Pennsylvania.
August P. Graf	Indiana.
H. C. Hadley, Ph.G.	Pennsylvania.
John L. Hughes	Pennsylvania.
Edgar C. Hoskin	Canada.
George G. Lawyer	New York.
Gabriel Middleton	Pennsylvania.
Michael C. Ryan, M.D.	Pennsylvania.
Geo. O. Reed, Ph.G.	Pennsylvania.
Henry L. Samelson	Tennessee.
John J. Stetzer	Pennsylvania.
Telesphore G. Turcot	Canada.
A. F. Wher	Pennsylvania.
Sam'l McR. Wharton	Indiana.
Chas. L. Zimmerman	Pennsylvania.

UNIVERSITY COLLEGE OF MEDICINE, DENTAL DEPARTMENT.

The annual commencement exercises of the Dental Department of the University College of Medicine were held in the Academy of Music, Richmond, Va., on Thursday, May 11, 1899.

The number of matriculates for the session was thirty-six.

The degree of D.D.S. was conferred on the following graduates by Hunter McGuire, M.D., LL.D., president of the college: John H. Castenbader, Joseph D. Ford, Wm. H. Pearson, Charles F. Furman, Charles T. Womack, all of Virginia.

DENTAL SOCIETY ANNOUNCEMENTS.

NATIONAL DENTAL ASSOCIATION.

THE annual meeting of the National Dental Association will be held in the ball-room of the International Hotel at Niagara Falls, August 1, 2, 3, and 4, 1899.

Railroad arrangements for the meeting have not yet been completed. A rate of one and one-third fare, on the certificate plan, has been granted by some of the railroad associations. Have not heard from all of them, but think that all will grant this concession.

Wednesday, August 2, has been arranged as the day in which the special agent of the railroad associations will be at the meeting to qualify certificates. All attending should be sure to get a certificate from the ticket agent when purchasing ticket going, showing that full fare has been paid, otherwise they will not be entitled to the reduction in fare on return ticket. Tickets for reduced rate will be good going July 24 to 27 inclusive, and returning not later than August 9.

Following is a list of hotels, with rates per day: Cataract House, $3.00 to $4.00; International Hotel, $3.00 to $4.00; Kaltenback Hotel, $3.00; Imperial Hotel, $2.50 to $4.00; Columbia Hotel, $1.50 to $2.00; Temperance House, $1.50 to $2.00; Niagara Falls House, $2.00; Niagara House, $2.00.

Dr. M. O. Cooley, of Niagara Falls, N. Y., will engage rooms and answer any questions regarding local arrangements for the meeting. Definite meeting places for Sections will be announced later.

It is the wish of the officers of the association that members make special efforts to be present at Section meetings, on account of the unusual number of valuable papers which must first be passed upon by the Sections to which they properly belong.

Reports from secretaries of Sections have not been received sufficiently definite to enable us to issue at this time a complete literary program.

The following is the preliminary program:

J. Leon Williams, of London, will present two papers, one on "Bacteriology," and the other entitled "Plain Words with My Critics."

N. S. Jenkins, Dresden, "Porcelain Enamel Inlays."

Edward H. Angle, St. Louis, "Orthodontia." Illustrated.

W. A. Price, Cleveland, "The Absolute Efficiency of the Controllers of the Market for Dental Cataphoresis."

L. E. Custer, Dayton, "Dental Electricity."

S. S. Stowell, Pittsfield, "The Practical Side of It."

E. P. Beadles, Danville, "A Bastard Profession."

Truman W. Brophy, Chicago, "Surgical Operations in Early Infancy for Palatal Defects."

E. K. Wedelstaedt, Minneapolis, "Cements."

James Truman, Philadelphia, "The Reflexes of the Three Lower Molars."

B. H. Catching, Atlanta, "Gomphosis."

R. Ottolengui, New York, "Prognathism." "Extraction and Delay *versus* Expansion and Early Attention." Illustrated.

W. V-B. Ames, Chicago, "Some Phases of the Cement Question."

Thomas Fillebrown, Boston, "A Study of Harelip and Cleft Palate." Illustrated.

M. L. Rhein, New York, "Pyorrhea Alveolaris."

H. S. Harvey, Battle Creek, "Constitutional Deterioration the Cause of Dental Caries."

W. C. Barrett, Buffalo, "Oral Affections in Secondary Syphilis."

C. L. Hungerford, Kansas City, "The Physiological Relation of the Adult Tooth-Pulp to the Economy."

Alton Howard Thompson, Topeka, "Etiology of Gnathic Abnormalities."

Robert H. Nones, Philadelphia, "Dies and Counter-Dies."

M. H. Cryer, Philadelphia, "Some New Points in the Anatomy of the Face and Jaw."

C. N. Johnson, Chicago, "The Management of Children's Teeth."

Also, subjects to be announced, by Drs. W. Geo. Beers, Montreal; G. V. Black, Chicago; H. L. Ambler, Cleveland; W. H. Whitslar, Cleveland; Joseph Head, Philadelphia; A. W. Harlan, Chicago; John S. Marshall, Chicago; A. H. Peck, Chicago; H. J. Goslee, Chicago; R. H. Hofheinz, Rochester; F. W. Low, Buffalo; G. V. I. Brown, Milwaukee; T. P. Hinman, Atlanta; H. H. Johnson, Macon; B. Holly Smith, Baltimore; C. Edmund Kells, New Orleans; M. C. Smith, Lynn; L. M. Cowardin, Richmond; L. L. Dunbar, San Francisco; W. Ernest Walker, Pass Christian.

Prominent members of the profession from abroad have been invited to be present.

The names of the gentlemen who have promised to present papers is a sufficient guarantee of the high character of work which will be done at this meeting. The minor details will be carefully looked after and all unnecessary and irrelevant matter eliminated, so that the business of the association may be transacted in a prompt and expeditious manner. It is hoped that the various State societies will send full delegations, and that all members of the association and reputable dentists in this country and Canada who are not members will show their interest in and loyalty to the National Association by attending this meeting.

H. J. BURKHART, *President.*
EMMA EAMES CHASE, *Cor. Secretary.*
J. N. CROUSE, *Chairman Exec. Committee.*

NEW JERSEY STATE DENTAL SOCIETY.

THE twenty-ninth annual session will convene at the Auditorium, Asbury Park, at 10 A.M., Wednesday, July 19, 1899, and continue the 20th and 21st. The hotel headquarters will be at the Hotel Columbia; the rates will be $2.50 per day two in a room, $3.00 per day one in a room.

The demonstration of porcelain inlay work will receive more than usual attention. Dr. Jenkins, of Dresden, will give a clinic with the Jenkins furnace, and read a paper on the subject.

Dr. Joseph Head, of Philadelphia, will also clinic with the electric furnace and read a paper; Dr. W. A. Chupein, of Philadelphia, will also demonstrate his method of inlay work, and read a paper.

The exhibition of electrical appliances for the dentist will be of more than usual interest, and of greater variety than usually seen at dental meetings. The clinics generally will be practical and of useful interest to the every-day working dentist. CHARLES A. MEEKER, D.D.S., *Sec'y.*

WISCONSIN STATE DENTAL SOCIETY.

THE twenty-ninth annual meeting of the Wisconsin State Dental Society will be held in the assembly chamber, Capitol Building, Madison, Wis., July 18, 19, and 20, 1899. A cordial invitation is extended to all members of the profession to be present.

The State Board of Dental Examiners will meet in the senate chamber, beginning Tuesday, July 18, at 9 A.M., for the purpose of examining candidates for license to practice.

W. H. MUELLER, *Secretary,*
21 West Main st., Madison, Wis.

NATIONAL ASSOCIATION OF DENTAL EXAMINERS.

THE next annual session will be held at Niagara Falls, N. Y., at the International Hotel, commencing at 10 A.M. Friday, July 28, and continuing Saturday, 29th, and Monday, 31st, adjourning in time for the opening of the National Association on Tuesday. It is hoped that delegates from every state will be present. As this session is some days ahead of the National, please write and secure your rooms as members of National Association of Dental Examiners. It is hoped that every state will be represented by delegates with certificates signed by the president and secretary of their respective boards. The rates will be $3.00, $3.50, and $4.00 per day, according to the location of the rooms.

CHARLES A. MEEKER, D.D.S., *Secretary,*
29 Fulton st., Newark, N. J.

AMERICAN DENTAL SOCIETY OF EUROPE.

THE twenty-sixth annual meeting of the American Dental Society of Europe will be held in Brussels on August 7, 8, and 9, 1899. Arrangements have been made at the Hotel Metropole for the accommodation of the members and their friends, while the meetings will be held at the Hotel Ravenstein.

Brussels and its surroundings are noted for their beauty and historical interest, and no effort is being spared by the Executive Committee to make the meeting especially instructive and pleasant.

A cordial invitation is extended to any American colleagues who may, at the time, be visiting Europe. WALDO E. ROYCE, *Secretary,*
2 Lonsdale Gardens, Tunbridge Wells, Eng.

BOARD OF DENTAL SECRETARIES TO NEBRASKA STATE BOARD OF HEALTH.

THE new Board of Dental Secretaries (Examiners) organized May 1, 1899, at Lincoln, as follows: Dr. W. C. McHenry, Nelson, president; Dr. H. W. Allwine, Omaha, vice-president and treasurer; Dr. L. N. Wente, Lincoln, secretary. The board aims to be active, and will be pleased to co-operate with the profession, state or national, on any questions that may be for the upbuilding of dentistry. H. W. ALLWINE.

MAINE DENTAL SOCIETY.

THE thirty-fourth annual meeting of the Maine Dental Society will be held in Pittsfield, Maine, July 18 and 19, 1899.

All members of the dental profession are cordially invited to attend the sessions.

H. A. KELLEY, *Secretary,*
609 Congress st., Portland, Me.

VIRGINIA STATE DENTAL ASSOCIATION.

THE thirtieth annual session of the Virginia State Dental Association will be held in the parlors of the Hygeia Hotel, Old Point Comfort, Va., July 25, 26, and 27, 1899. A cordial invitation is extended to all members of the profession.

IRVIN B. SMITH, *Chairman Exec. Com.*

MINNESOTA STATE DENTAL ASSOCIATION.

THE sixteenth annual meeting of the Minnesota State Dental Association will be held at Northfield, July 25, 26, and 27, 1899. Steps are being taken to make this the best meeting of the association. All dentists are invited to attend.

H. L. CRUTTENDEN, *Secretary,*
Northfield, Minn.

CALIFORNIA STATE BOARD OF DENTAL EXAMINERS.

THE next meeting of the California State Board of Dental Examiners for examination of candidates for license to practice will commence at 9 A.M. on the first Tuesday in August, 1899, in San Francisco.

W. A. MOORE, *Secretary,*
Benicia, Cal.

EDITORIAL.

THE BRITISH DENTAL ASSOCIATION AND THE FRENCH CONGRESS.

THE annual meeting of the British Dental Association recently held at Ipswich was productive of several instructive and interesting features, not the least of which was the address of Mr. J. Howard Mummery, the newly-elected president.

Quite apart from its interesting historical *résumé* of the progress of dental science and art during the century now closing, the address is commendable because of the broad spirit of professional catholicity which pervades it throughout. It is gratifying and refreshing to read a presentment of the character noted, in which the view taken is cosmopolitan and entirely free from any suggestion of petty jealousy and territorial narrowness,—sentiments which should have no place when intellectual and scientific matters are under consideration.

Knowledge belongs to no country by exclusive right, but is the universal property of humanity; and in recognition of that fact it is gratifying to note that in his address Mr. Mummery gave generous credit to those who, by virtue of superior ingenuity or intellectual attainment, have aided the general cause of dental advancement without respect to birth or nationality. To American dentists he frankly accords the honor of the discovery of practical anesthesia, the introduction of cohesive gold work, the rubber-dam, and the dental engine, and his cordial utterances aroused no expressions of dissent.

But the spirit of the presidential address, we regret to say, did not wholly animate the subsequent proceedings.

Dr. Sauvez and M. Jules Choquet, delegates representing the Paris International Dental Congress of 1900, were the bearers of an official invitation to the British Dental Association to send representatives to the Paris Congress. The invitation was conveyed in a graceful and fraternal address by Dr. Sauvez, which was received with expressions of approval, and the *entente cordiale* of the French delegates seemed to have met a sympathetic response, when a member, Mr. J. Smith Turner, said,—

> "he was unwilling to show any spirit of opposition to the proposal of the gentlemen who had taken up the matter of sending delegates to the International Congress. He was as desirous as any one of promoting international good feeling. He felt it was a good thing for all that there should be gatherings of the kind, but they must not allow their kind feeling and their eager desire to consent to the proposal to run them into difficulties. ('Hear, hear.') There were one or two difficulties which presented themselves to his mind with reference to this International Congress. Individually, they might wish that the proposal should be carried out, but what was to be desired was that the association should not take up a false position in the matter. He believed that in Paris there were two dental bodies, and he should like to know how they were working together in regard to the proposed congress. He was sorry to say that there was another objection which influenced him in the matter of joining this pleasant congress. He had entertained the objection since the beginning of the year. He regretted to say it, but it was founded upon an editorial which appeared in the DENTAL

COSMOS, from which he would read an extract or two on which he grounded his objection. Referring to this Dental Congress in Paris, the article says,—

"'To American practitioners the invitation to take an active part and be adequately represented in a movement of this character is always welcomed, for the reason that in America dentistry has had its most active development and American methods have made the deepest impression upon the growth of dentistry as a whole; facts of which the American practitioner is naturally proud, and which he is always glad of an opportunity to emphasize.'

"Mr. J. Smith Turner read another extract from the COSMOS, which had also reference to the position taken up by American dentistry, and he said he did not blame the American practitioner for being naturally proud; he did not discuss whether they were right in their views as to the growth of dentistry, but he rather objected to going to a congress when such a position was taken up by a nationality which would probably contribute the largest number of its members. (Cries of 'No, no.') He could not help thinking that if this congress was to be taken possession of, or, rather, to be supported by, sentiments such as he had just read, they should be chary, as an association, of committing themselves to anything like an active participation in it.

"After some discussion as to the terms of the motion passed by the Representative Board,

"Mr. Cunningham said that on behalf of the French delegates he should like to reply to the remarks of Mr. Smith Turner. A question had been asked as to the position taken by the two dental bodies in Paris with reference to the congress, and he might say at once that there was no uncertainty about the matter. There were two dental bodies in Paris,—the Odontological Association and the Dental Association. There was going to be an International Congress of the first-named body, but it would not meet at the same time as the Dental Congress. Dr. Sauvez and his colleague were members of both societies, but they brought over the present invitation as members of the National Dental Association of France, and as representatives of a national movement. ('Hear, hear.')

"Mr. Craig said it would be in the recollection of members that some few years ago, when a Dental Congress was held in Chicago, exception was taken to some small technical point, and England was not represented that day because of something that had appeared in a journal which they did not recognize. (A voice: 'And which is not representative.') It appeared as if another hitch were going to take place just at a time when England and America were becoming more like brothers. He thought it would be a great mistake and misfortune to allow anything of the kind to interfere in the least degree with the answer they should make to the invitation from France. If a great International Congress were to be held in Paris next year, England must be there. ('Hear, hear,' and applause.) There was no society but their own which was able to appoint representatives of the country. Why should we allow any little quibble to prevent a tie of brotherly friendship between ourselves and the men over the other side of the channel? Let them see to it that a committee was appointed to go forth with credentials from the association and see that Great Britain was worthily represented at the congress. (Applause.) He hoped on that occasion to see men of all countries brought more closely together and the Stars and Stripes, the Union Jack, and the Tri-color of France waving side by side. (Laughter and applause.)

"Mr. Smith Turner, in the course of conversation, asked whether he was to understand that the DENTAL COSMOS was not a representative paper.

"Mr. Booth Pearsall (Dublin) said the COSMOS did represent a certain portion of American dental opinion, but there was no reason to apprehend from the article Mr. Smith Turner had read that American dentists would not act in sympathy with representatives of other nations. He assured Mr. Smith Turner that there had been a great alteration since he (Mr. Turner) went to America twenty years ago, and that, so far from being jealous of English dentists, the Americans were as willing to take any hints as they were to give any, and they could give useful hints in abundance.

"Mr. W. H. Breward Neale said, personally, he felt that it would be a great advantage for this country to be represented, and, further, he felt that there was no other party of gentlemen, no better executive in this country, than the gentlemen proposed to conduct the negotiations and carry them through. They would certainly be safe in the hands of those gentlemen.

"The meeting became somewhat impatient at the length of the discussion as to the exact terms of the resolution, and amidst cries of 'Vote, vote,' it was put and carried in the following form:

> " 'That the committee already appointed and the Representative Board, consisting of the president, the hon. secretary, Mr. Dolamore, Mr. Cunningham, and Mr. Hopewell-Smith be empowered to act as the National Committee at the International Congress of 1900, with power to add to their number.' "

Had Mr. Turner's sentiments echoed the spirit of any considerable constituency, or, to quote his own expression, been "representative," the British Dental Association presumably might have re-enacted in a modified way the proceedings which "broke up the society upon the Stanislow," as depicted by Mr. Bret Harte; but fortunately, as the report shows, the sentiments were not representative of any one's feelings but those of the gentleman who uttered them.

The state of affairs set forth in the foregoing quotations furnishes the best evidence yet presented of the need for an international congress as contemplated, and in which the British dental profession shall be properly represented.

We gather from the report that it is twenty years or more since Mr. J. Smith Turner has had opportunity for personal observation of American dental practice or educational methods. Time works wondrous changes, and on this side of the Atlantic the rate of change is rapid, especially in matters dental; so that opinions based upon observations made nearly a generation ago are necessarily antiquated and faulty as related to existing conditions.

Mr. Turner "does not blame the American practitioner for being naturally proud, but he rather objected to going to a congress when such a position was taken up by a nationality which would probably contribute the largest number of its members."

The source of irritation seems to have been the paragraph quoted from an editorial in the January issue of this journal, and read by Mr. Turner in defense of his extraordinary position. Now, the paragraph in question is not only inoffensive in itself, but was intended to have an entirely opposite effect from that which it seems to have produced in the mind of the gentleman who brought it so prominently to the attention of his colleagues. The *motif* of the paragraph is the cordial attitude of American practitioners toward the effort of our French *confrères* to hold an international congress. Incidentally, as we have done a few things for dentistry of which we feel "naturally proud," we innocently alluded to that fact,—not with the expectation of arousing antagonism, but of stimulating a spirit of friendly rivalry which would lead to an exhibit in Paris of the best in dentistry that each nation had contributed to the advancement of our common calling.

With reference to the exhibit of technic work done by American dental students, submitted as a part of Mr. W. Booth Pearsall's paper, his comment, as reported in *The Dentist,* June 1, 1899, p. 379, was, "If any of his apprentices came to him with work which was no better than those (?) contained in the cases, those apprentices would get rather a warm reception."

The question of fact as to the relative quality of the work of Mr. Turner's apprentices and that of American dental students submitted by Mr. Pearsall is secondary in importance to the bitterness of feeling which the criticism manifests on its own internal evidence. It is to eliminate sentiments of that character among dentists that we need an international congress. Mr. Turner owes it to himself to attend the Paris congress, so that he may have the opportunity to correct some of his views relative to American dentists and their methods of practice by coming into personal contact with them; and, in view of his assertion, he owes to his colleagues everywhere an exhibit of the work of his apprentices, in order that all, and, among others, our American students, may profit by the superior excellence of the technique which he claims for his own.

The splendid work of Mr. Turner in securing effective dental legislation in England, and his championship of the cause of higher dental education, are facts which are not compatible with an attitude of antagonism toward those who are honestly striving for the same ends. Certainly it cannot be granted that the whole of dentistry is the property of any class or nationality, and if the English-speaking dentists of the world are permitted to unite with their colleagues in the proposed international symposium at Paris, dentistry will receive an upward impetus which it is our duty to achieve for it.

We are quite sure that the spirit manifested at the Ipswich meeting has its basis in a deplorable misunderstanding of the attitude of American practitioners, and one which the civilizing effect of personal contact will promptly dispel.

We congratulate the British Dental Association, also the promoters of the International Dental Congress, as well as the whole profession, that this one manifestation of provincialism was not permitted to interfere in the arrangements for a meeting which it is sincerely hoped will wipe out the last vestiges of international jealousy and establish fraternal relations among reputable practitioners of dentistry everywhere.

BIBLIOGRAPHICAL.

A MANUAL OF COMPARATIVE DENTAL ANATOMY FOR DENTAL STUDENTS. By ALTON HOWARD THOMPSON, D.D.S., Professor of Dental Anatomy, Human and Comparative, in the Kansas City Dental College, Kansas City, Mo. Small 8vo, pp. 176. 40 illustrations. Philadelphia, The S. S. White Dental Mfg. Co., 1899. Price, $1.50 net.

That the author of this concise and valuable work found a publisher who could place his thoughts or the result of his studies so attractively before the public is most fortunate; and, on the other hand, the publishers are to be congratulated on being furnished with material so essential to every well-educated dentist. One whose ambition would lead him to aspire to be recognized as an educated dental practitioner could only hope for such recognition on being familiar with the facts and principles embraced in this little work. The reviewer would like to impress upon every dental student and practitioner the great satisfaction and pleasure he has derived from the limited time he has given to the study of comparative dental anatomy. If he could do this not one would be content until he possessed this little volume and read it and re-read it, until he was sufficiently familiar with its contents to fully appreciate not only the relation, but the near and constant affinity and homology that exists between the human teeth and those of other vertebrate animals. A single conception in connection with this one thought of homology, recognized and appreciated, is worth the price of a dozen books to every dental practitioner. To have established without liability to criticism or doubt that the shape, density, enfolding of the structures, and durability of the teeth are all largely dependent upon function or use, is knowledge without price.

General works on comparative anatomy are not adapted to the special needs of the student of dentistry, but the mission of the author has been to select and arrange for the perplexed and anxious student the material required for the illumination of his studies of the human teeth, and also general principles involved in the philosophy of tooth-forms and the continuity of the whole subject of tooth evolution and development.

In larger works the student could of course find much material bearing on this subject, but the author's years of study have resulted in sifting the special matter needed; and in this *manual* it is presented in a concise, intelligent, and readable form. In this admirable thesis the lowest forms of life are first briefly described, then in regular gradation higher forms are reached. The same method is adopted regarding the teeth seriatim, from the lowest or most primitive types upward, giving their progressive evolution from the simple to the complex forms.

Not only of great interest, but of great value to the student and teacher, is the list of questions given at the close of each chapter. These embrace the salient points of the text, and in a few moments the review of what has just been read is made, bringing it fresh in memory.

The book is divided into nine chapters, with forty beautiful illustrations; the latter especially valuable in giving the student a physical view of the structures described. Fig. 1, for instance, being but a greater and lesser circle, gives a very definite idea of the vertebrate series and its neural and visceral arch. Fig. 2 also conveys from its general shape a definite idea as to why the dental apparatus of the sea urchin—one of the echinoderms—was called Aristotle's lantern. The fine, rodent-like incisors, highly developed and complex in structure, found in this primitive stage of animal life are among the wonders of dental anatomy. An apparatus of such complicated mechanism can only be fully appreciated when we understand its function,—drilling holes in the shells of mollusks for food, and in rocks, where the animal may be partially imbedded and protected. These teeth are hard and calcareous, the enamel, arranged as in the beaver and other rodents, being thicker on one side than on the other, so as to insure continued sharpness, or a chisel edge from wear. Such is the complex structure of the mouth of this animal (Echinus esculentus) that it is not less remarkable on account of its mechanism and singularity of construction than as exhibiting an example of the sudden development of a dental system that has no counterpart in any of the preceding Echinoderm families.

The limited space to which this review must be confined will preclude further comment on Chapters I, II, III, but their contents cannot but stimulate a desire for a more extended knowledge of the dental organs of the invertebrata, such as the leeches, lobsters, and crabs, and the great variety of snails, the teeth in some of the latter ranging in number from twelve thousand to forty thousand. Chapter IV, "The Teeth of Vertebrates," is replete with interest. In this great sub-kingdom, as the author states, true teeth are the rule and not the exception, but the variety in this department is keenly displayed in structure, shape, size, location, number, and attachment. Notwithstanding this diversity, the author in twenty-five pages gives the reader a general outline, so that the subsequent chapters on the teeth of fishes, reptiles, mammals, and the higher apes and man will be read with greater interest and more fully appreciated. The three pages of questions following Chapter IV are so suggestive and impressive that one cannot thus make this review without realizing that he has added much to his store of knowledge.

The remainder of the book, necessarily so limited in its description of each of the above-named groups, embraced in Chapters V, VI, VII, VIII, and IX, maintains its interest for the student, while the reader who is familiar with comparative dental anatomy must remember that the author in condensing and arranging his facts must be allowed some liberties in classification. On account of this unavoidable brevity, the teacher who desires to be critical and minute will be required to elaborate and illustrate his instructions by the use of skulls, charts, and individual teeth.

The closing paragraph of Chapter IX is of interest to ethnologists as well as dentists, if the following statement can be sustained: The author says that physical degeneracy has been reflected in the teeth of Europeans in America to an extraordinary extent by the intermixture of races, to which have been added the deleterious influences of strange climates, irregular habits, and the feverish pursuit of the elusive pleasures of so-called civilization.

C. N. P.

OBITUARY.

DR. SIMEON L. CLOSE.

Died, at his home in Mount Vernon, N. Y., June 10, 1899, from heart-failure, Dr. Simeon Lafayette Close.

Dr. Close was of New England descent. His ancestors, who came from England, settled at Greenwich, Conn., at the beginning of the last century. His grandfather, Daniel Close, fought for the Revolutionary cause in the battle of White Plains. His father, Zacheus Mead Close, removed from Connecticut to New York state about 1820, and settled at Genoa, in Cayuga county, where he married a daughter of Judge Simeon Crane, and where the subject of this notice was born, November 29, 1824.

In 1832 Zacheus M. Close became a pioneer in the territory allotted to Connecticut in the northern part of Ohio, known as the Western Reserve. His death in 1839 left to young Simeon the care of his widowed mother and her four other children.

Having a bent toward the profession of medicine, Simeon became, a few years later, a pupil of Dr. Rawson, of Richfield, Ohio, remaining here six years. His preceptor's library, in which he was deeply interested, served to confirm his choice of a profession. Unpropitious circumstances for a time prevented his taking a regular course of medical study, but he never lost sight of that object, and employed his spare hours in medical reading. At length, after some vicissitudes, including experiences as a district school teacher and also some time spent in the employ of a railroad company, he was able to gratify his cherished ambition, and took the regular course and was graduated from the Ohio Medical College. He had previously married, at Glendale, Ohio, Harriet Newell Gaston, by whom he had four children, three of whom are now living,—viz, Monteith E., Zacheus A., and Martha E. (Mrs. E. M. Davis). His wife died in 1882, and a few years later he married, at Niagara Falls, Cornelia G. Close, who survives him.

The practice of medicine in Ohio apparently did not yield him complete satisfaction, and he decided to turn his attention to the dental branch, in the mechanical part of which he was destined to find his special field of work as well as a considerable pecuniary reward. Proceeding from Hinckley, Ohio, to New York city, in 1859, he entered the office of Dr. John Allen, with whom he remained until 1866, when he opened an office of his own. Later, on the death of Dr. Allen, he took up the manufacture of the improved continuous gum of which the latter was the inventor. This he continued to attend to, with his professional work, until his death. His son, Dr. M. E. Close, has for many years been associated with his father in the business.

From 1864 Dr. Close resided at Mount Vernon, and was prominent in the affairs of that city. Here, in 1874, he built himself a commodious residence, and as he was a great lover of flowers his elaborately laid out garden was an attraction widely known. He belonged to Hiawatha Lodge, No. 434, F. and A. M., and to Bethlehem Commandery, No. 53, K. T.

Dr. Close was an active member of the Swedenborgian or New Church, to which he was a generous benefactor. For many years the services of the society were held at his house, until through his exertions a church edifice was constructed. Rev. Mr. Seward, of the New Church, conducted the funeral services, which were held Monday, June 12.

DR. J. M. PORTER.

DIED, May 7, 1899, at Denver, Col., Dr. J. M. PORTER, in the fiftieth year of his age.

The Colorado College of Dental Surgery, recognizing the services rendered by Dr. Porter in the advancement of dental science, has adopted and ordered sent to the relatives and dental journals and spread upon its minutes the following:

"Dr. Porter was born in Massillon, Ohio, in the year 1849. He graduated at the Ohio College of Dental Surgery in 1872. In 1880 he came to Denver, Col. He has always been an active, conscientious worker for the advancement and elevation of his chosen profession.

"He has at various times been connected with educational institutions and examining boards, occupying positions of trust and discharging his duties efficiently and conscientiously. At the time of his death he was an active teacher in the Colorado College of Dental Surgery, and his genial countenance and cheering words will long be remembered by the many students who loved and honored him.

"He was a member of the Colorado State Dental Association and the Denver Dental Society, the latter society having charge of the burial services. The dental profession has lost one of its most loyal supporters and earnest workers. The esteem and good will of the profession was evinced by the elaborate floral decorations and the large attendance at the funeral.

"The dental profession recognizes its loss, and keenly sympathizes with the bereaved relatives and friends."

A. L. WHITNEY, *Secretary.*

DR. THOMAS A. SHINGLE.

DIED, at Ocean City, N. J., June 11, 1899, of cancer of the stomach, THOMAS ASHTON SHINGLE, D.D.S., of Philadelphia.

Dr. Shingle was born in Germantown (Philadelphia), Pa., in 1844. He received his education in the public schools. During the invasion of Pennsylvania in 1863 by the Confederate armv under General Lee young Shingle served in Lander's Battery. He afterward joined Battery A, then known as the Keystone Battery, and finally enlisted in the Fifth Pennsylvania Cavalry, with which he remained till it was mustered out at the close of the war. He then entered the employ of Dr. Samuel S. White, continuing in that service till about 1893, when he began the study of dentistry with Dr. Henry I. Dorr.

Dr. Shingle was graduated from Philadelphia Dental College in 1896, and immediately commenced practice in his native city. His gentlemanly ways, combined with his undoubted skill, were fast building up a lucrative practice, when the progress of the malady which caused his death disabled him. He was a man of genial disposition, considerate of others always, conscientious and painstaking, a man to make friends and retain them. His popularity among his classmates led to his election to the presidency of the Ki-Psi-Phi Fraternity.

Dr. Shingle was twice married: First, to Miss Rachel Burk, who died after a few years, preceded shortly by their only child. He afterward married Mrs. Emma Allmendinger, who died last December. Two children were the fruit of this union, both now dead.

DR. FRANCIS M. POULSON.

DR. FRANCIS M. POULSON, of Lansingburg, N. Y., died suddenly at his home in that place on May 18, 1899, at the age of fifty-two years. He had complained the day before of pain in the stomach, from which neither he nor the physicians whom he consulted anticipated any serious results, but he was found dead in his bed early the next morning.

He was born in 1847, near Holmesville, Ohio, where he lived until about 1866, when he went to Missouri and taught school there most of the time for several years, after which he studied dentistry, first at Ann Arbor University and then at the Philadelphia Dental College, where he graduated March 1, 1882. He practiced first at Shenandoah, Pa., until a disastrous fire swept the town and destroyed his every earthly possession except his diploma. He then located in New York city and remained there until about 1890, when he removed to Lansingburg and practiced there until his death.

Dr. Poulson was married about 1889 to Miss Lillie S. Bacon, of New York city, who, with their two children, a son and a daughter, survives him. He was a devoted husband and father, was highly esteemed for his genial and kindly disposition, and will always be remembered with affection by all who knew him.

He gave much of his time to the invention of improvements in dental tools and appliances, as well as other devices. Some of his inventions have been patented, some before and some since he studied dentistry. He had two or three applications for patents pending at the time of his death.

DR. J. P. GERAN.

Dr. J. P. Geran died at his residence, Greene avenue, Brooklyn, N. Y., March 28, 1899, in the sixty-seventh year of his age. He was born in Monmouth county, N. J. Having acquired a knowledge of dentistry, he began professional practice forty years ago. Dr. Geran is survived by a widow and one son. He was a member of the Oxford and Aurora Grata Clubs, and of the Brooklyn Masonic Veterans' Association and Aurora Grata Lodge, Scottish Rite.

LIST OF UNITED STATES PATENTS

PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING MAY, 1899.

May 2.—No. 624,015, to George B. Hakins. Dental disk-holder.
" " No. 624,137, to Claison S. Wardwell. Dental engine.
" " No. 624,425, to Axel F. Bogren. Dental operating chair.
" " No. 30,693, to Enoch M. Fredericks. Supporting piece or plunger for dental chairs. (Design.)
" *9.*—No. 624,722, to William O. Allen. Tooth-crown holder.
" " No. 30,744, to Arthur W. Browne. Fountain spittoon bowl. (Design.)
" *16.*—No. 625,043, to Theodore G. Lewis. Dental plugger.
" *23.*—No. 625,354, to Alanson H. Putnam. Dental spatula.
" " No. 625,401, to Alvan P. Lauterman. Dental tool.
" " No. 625,425, to Richard W. Sonnex. Dental chair.
" " No. 625,434, to Arthur W. Browne. Syringe nozzle.
" *30.*—No. 625,888, to Laurence P. Leonard. Dental matrix clamp.
" " No. 626,066, to Frank Hurlbut. Attachment for dental spittoons.
" " No. 30,883, to Edw. N. La Veine. Rubber-dam clamp. (Design.)

A MONTHLY BIBLIOGRAPHY OF DENTAL LITERATURE.

COMPILED BY J. MELVIN LAMB, M.D., D.D.S., WASHINGTON, D. C.

The abbreviations of titles used are those common to bibliographical work, and will, it is presumed, be readily comprehended by any one familiar with dental or scientific publications. Any explanation will be gladly furnished by the compiler. A star (*) indicates a thesis.

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ORIGINAL COMMUNICATIONS.

THE EVOLUTION OF THE PATIENT.

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THE old Mosaic theory of creation comprised a distinct genesis for each species of plants and animals. Each species was supposed to have been brought forth fully developed, as it exists today, by an act of special creation. Every one of the innumerable varieties of living things could claim its individual Adam and Eve. This view of the matter, authorized by Scripture, and therefore an article of faith, endured, with few and ineffectual protests, down to the middle of the present century. Then, on November 24, 1859 (only forty years ago), there appeared a book by a comparatively obscure English naturalist in which the experiments and observations of twenty-two years were presented in support of the theory that species are the results of modifications of a common ancestral form.

Curiously enough, this view had been arrived at simultaneously and independently by another English naturalist, then on the other side of the globe. The results of the introduction of this theory to the scientific world were stupendous; it can be described as nothing less than revolutionary. Assailed with that malignancy with which theology has ever combated scientific discoveries, from the demonstration of the true form of the earth to the introduction of anesthesia, the doctrine of evolution steadily gained ground and disciples, until from a theory of biology it has been extended to every pinnacle of thought, reconciling apparent incongruities, throwing light upon unexpected relationships, disclosing, in a word, not only the details of the completed structure, but the scaffolding by which its erection was made possible. When, later, embryology made known the fact that the varied transmigrations through which a given form has passed during its development from a lower to a higher type of structure are recapitulated in the development of the embryo of that species, it seemed to the skeptics as though nature herself were in league with the evolutionists. In the argument as published all application of its principles to human origin was studiously suppressed, Darwin merely hinting in the first edition of the "Origin of Species" that by this work "light would be thrown on the origin of man and his history." In 1871 he published "The Descent of Man," the result of many years of study. Its conclusions had been anticipated, it is true, by the previous work; they were also immensely strengthened by the published investigations of Herbert Spencer as to the customs of savage tribes, and in particular by the vast mass of testimony previously unearthed by anthropologists as to the

Antiquity of Man.

From the comparatively recent date of about 4000 years B. C., as dogmatically established by the church (and perpetuated, I regret to say, on the corner-stone of our own city hall), it became necessary to antedate man's arrival by some thousands of centuries. Still more startling, a study of his early remains, associated with the bones of extinct animals and covered by drift, silt, lava, stalagmites, in caves and river valleys, lake basins and mountain tops, indicated a race small-brained and bestial in its physical structure beyond any hitherto known. And these remains continued to be unearthed, not in any one locality, but in every continent of the globe.

His Physical Imperfection.

Furthermore, sundry irreverent anatomists put forth from time to time criticisms of various details of the human body which went far toward demolishing the old, fascinating, self-satisfying belief that we were paragons of structural perfection. Not only were a vast number of useless or vestigial structures pointed out, but it was proven by their location that the valves of the blood-vessels, the supporting ligaments of the viscera, and the like, were designed for a quadrupetal rather than an upright position of the body.

Some even went so far as to intimate that learning to stand on our hind legs constituted the original sin. And, as if this were not enough, Professor Cope demonstrated that organs of so distinctly human a pattern as our teeth and our feet, upon whose excellences we rather prided ourselves, were of a pattern so old that the great majority of mammals had discarded them some generations prior to the Glacial Period. This humiliating acknowledgment of inferiority, while at variance with the traditional God-like attributes of mankind, has proved of notable aid in the study of the causation of disease, of degenerations, and of abnormalities in general.

The predisposing causes of dental caries in the human race can thus be traced with confidence in the light of its ancestry and development. The exact sequence of these causes, or whether two or even more may not have worked simultaneously, are to some extent matters of opinion,—of interpretation of evidence.

Undoubtedly among the first, however, is our inheritance from pre-human ancestors of that primitive, unspecialized type of dentition characterized as *bunodont*, in which the crowns of the teeth are elevated into cusps,—a type of tooth found in a majority of the mammalia from the early Miocene horizon of the tertiary strata, and from which the more specialized dentures of modern Carnivores and Ungulates were evolved by the slow modifications brought about by usage and environment during many generations.

Another predisposing factor was the transfer of prehension from the mouth to the hand. With the gradual acquirement of mobility of the forearm and phalanges, with the ability to convey food to the mouth and to manipulate adjacent objects with the forelimbs, the jaws and lips resigned to a large extent their ancient monopoly of the prehensile function, and, through that correlation of structure observable in every mammal with a rotating radius, a reduction in length of the jaws followed.

The great diastema immediately behind the canines in Ungulates closed up, leaving only those smaller gaps for the reception of the canine teeth found in dogs, cats, apes, etc. And here we come to that parting of the ways where the Primates began to separate from the common stock. That such a divergence did occur, and that it has occurred in every order,—leading the Cetaceans and Sirenia to seek the ocean, giving the Bats dominion over the air, stimulating the Rodents and Insectivores to forsake their terrestrial abodes for the greater security of subterranean galleries, and leaving the Monotremes and Marsupials of Australia to alone perpetuate, with few and minor alterations, the primitive structure of their forefathers,—that such divergences did occur is established by the records of paleontology: records more enduring than brass, memoirs written in a universal language by the bones of vanished races. But the immediate causes underlying these impulses toward specialization are in many cases exceedingly difficult to establish.

Why the ancestors of the Whales, for instance, should have left the dry land for ever, exiled to ocean, like Captain Nemo and his crew, can only be conjectured. Yet that they were originally terrestrial is proven by their structure. So, too, the precise circumstances leading to that excessive development of the nervous system characteristic of the Primates are unknown.

It is believed that some potent stimulant, possibly that very physical inferiority of our pre-human ancestors, their defencelessness against their more highly specialized enemies, so much swifter and better armed, forced the former into diplomacy.

They learned that, by taking thought, dangers that could not be squarely met could be avoided. And, as thoughtlessness entailed capture and extermination, the survivors constituted a mental aristocracy, constantly growing in sublety, expediency, and resourcefulness.

Small wonder that the proliferation of cells in the cortex of those awakened brains continued, until thrown into more and yet more convolutions as its area came to exceed that of the more slowly growing brain-case.

Small wonder that the higher education became popular in a community whose prizes were additional years of existence, and where failure entailed certain disagreeable personally conducted physiological experiments with the gastric juices of the lower animals.

Small wonder that co-education without bribes or entreaty obtained, where the ignorance of the females would have threatened the extinction of the race.

On these lines, then, by the pitiless forces of Nature, was evolved this big-brained mammal, in unconscious accordance with Mr. Herbert Spencer's doctrine of the survival of the fittest.

Causes of Arboreal Existence.

In a wooded country these survivors, endowed with that primitive, plantigrade five-toed foot so fatal to rapid locomotion, yet so favorable for climbing, undoubtedly took to the tree-tops for protection, precisely as do natives to-day when camping in a jungle.

But, beleaguered by a host of ferocious enemies, hyenas and wolves, tigers with canines eight inches long, not to speak of blundering Proboscidians as big as freight cars, they concluded to stay there a while, "even as you and I" would have done.

Now, the results of this enforced mental exertion and such arboreal life constitute to-day the main physical differences between the Primates, including man, and the remainder of the mammalia. These are: an immense proportional development of the cerebrum, the perfection of the prehensile or grasping function of the hand, and compensatory modifications of the curve of the vertebræ and of the articulations of the skull, adapting them to an erect posture. As to this erect posture, I believe that it was primarily brought about *by* gravity rather than against gravity; that they *hung down* to a perpendicular rather than *stood up* to it. And simply the accident of an earlier acquirement of prehension by the anterior extremities made them hang *heads up*.

Were we descended from the Bats, which are so close to man's order that they were once classed with him, we should undoubtedly have hung *heads down*, as do they, and either evolved wings or learned to walk on our hands, which by inevitable logic would have resulted in our shoes being trimmed with ostrich plumes and velvets, and in frequent half-soleing of the crowns of our hats.

I introduce this hypothesis merely to accentuate the point that what we regard as normal is simply what happens to obtain in our immediate neighborhood or class.

As a matter of fact, the bipedal posture, with its resulting modifications of structure, is, viewed from the broad zoological standpoint, an extreme example of adaptation to environment.

Having thus accustomed themselves to an upright position, its assumption during terrestrial excursions is rational on the ground of habit. When these excursions became longer, as by enforced migrations due to drought or forest fires, the compensatory lumbar and cervical curves developed thereby gradually rendered equilibrium possible without the aid of a staff, the clasping of the hands behind the head, or other methods of balancing habitual with arboreal apes. The sole of the foot, from being everted, comes to a position in the same plane with the ground.

Thus we came to earth again.

That the human infant at birth possesses a strength of grip out of all proportion to its subsequent development; that it lacks the lumbar curve so necessary to the maintenance of the erect posture; that the soles of its feet are strongly everted, or turned inward, and that its toes are functionally useful, are indications that the tissues still retain memories of that family tree so carefully banished from modern genealogies. The return to earth was a return to an animal or mixed diet, and thus far a good thing from a dental standpoint, as we shall prove later.

But the excessive shortening of the jaws rendered necessary to maintain the balance of the head upon the neck in the upright position was undoubtedly a predisposing cause of caries, as the teeth were thereby crowded together until they touched at all points save where the canines overlapped.

These formidable tusks, projecting far above the other teeth, used in many male animals chiefly in those sexual combats for the possession of the females which insured the perpetuation of the physically robust,—these natural weapons were themselves doomed by that same scheming brain that co-ordinated vocal noises into a vehicle for the interchange of thought, and elaborated the number of fingers and toes into the decimal system of notation.

That this loss of differentiation in height of the teeth, with the closing of the then needless diastema, is an example of the atrophy of an organ through disuse seems clear. The disuse of the natural weapons, with no cessation of hostilities, implies the transfer of their functions to

Artificial Weapons.

But since that absence of a diastema, so characteristic of the teeth of man, not only renders his denture a veritable trap for particles of food, but, allowing no room for abnormally large or additional teeth, is responsible for dental irregularities as well, we are forced to infer that the *invention of weapons* was another of the predisposing causes of caries.

The invention of tools bereft the teeth of still another time-honored function.

The next great advance of our barbarian forefathers, the discovery which alone made possible the colonization of the higher temperate and frigid zones, was that of the perpetuation and artificial production of fire.

Discovery of Fire.

Mother of all the arts was she, as well as a sure protector against wild beasts and hostile elements.

Cookery followed, and some lucky accident of calcined clay led to the invention of pottery.

The raw meat, roots and vegetables constituting the ration of the wandering, homeless, shivering savage were exchanged for the more edible roasts and stews of the primitive cook.

A certain permanency of habitation became necessary, not only for the preservation of the fire, which experience taught was more readily lost than lighted, but for the safekeeping of that pottery, which even now constitutes one of woman's gravest responsibilities. Picture the result.

Protected from the gloom with its mysterious noises and hidden terrors, from the attacks of stealthy carnivores, and the inclemency of the weather of those primeval haunts, the rude dwelling stands revealed in an oasis of light, a magic circle drawn by the wand of the fire king. Within is warmth and comfort, without the incessant, pitiless warfare of life seeking life. The glow of the camp fire reveals faces strong with dawning intelligence, the hunter occupied with preparations for the morrow's chase, youths engaged in fashioning some article of personal adornment or domestic implement, with that profusion of decorative treatment so universal among savages. The women of the household busied with domestic duties of very much the same nature as to-day, and a wide-eyed, solemn-faced babe or two watching its elders. Food, preserved by cookery, contained in receptacles fashioned of clay or plaited grasses, renders them, for a time at least, masters of destiny.

Surely this must be the genesis of a new order of things, this vision of the firelight. That it marks an epoch in the evolution of the race cannot be doubted. But from a dental standpoint it was a step fraught with disaster to generations yet unborn. The connection is obvious; organs degenerate through disuse, or through too feeble use. At this stage man's teeth, instead of being employed for a variety of purposes, were used almost exclusively for mastication. But as cookery softens food, mastication is thereby rendered easier, and the tooth-substance tends to degenerate. As Miller points out, "pressure brought to bear on teeth by mastication causes a more lively circulation in the periosteum and in the pulp, thereby inducing an increased deposit of lime-salts or a more complete calcification."

Another disadvantage of cookery is that it renders food more fermentable.

From these early beginnings already sketched, mankind rose through advancing stages of savagery and barbarism to the various levels at which we find him now. To the present day some tribes follow the nomadic life once common to the race.

The Domestication of Animals.

The domestication of animals gave rise to those pastoral peoples whose flocks and herds still dot the steppes of Tartary and Siberia and the pampas of South America.

Still others found in agriculture "a local habitation and a name." A fixed food-supply, sedentary habits, and division of labor here foreshadow the complex industrial communities of modern times. The flesh diet of the hunter was exchanged for one mainly vegetable, with the result that the pressure of population on subsistence became less strenuous, famines fewer, and the future more secure. The evolution of the savings bank can be traced from the granaries of those early farmers.

To appreciate the immense and baneful influence of agriculture upon the human teeth, the immediate cause of dental decay must be investigated. The fact that the teeth are subject to pathological changes was John Hunter's argument against the old belief that these organs are extraneous and inorganic substance. Many have been the theories advanced as to the origin of caries. The most important, as tabulated by Miller, are depraved juices accumulated in the teeth; disturbances of nutrition; inflammation; worms; putrefaction; chemical dissolution; parasites; electrolytic decomposition; diverse causes, including various diseases; chemico-parasitic influence. Of these the last is the only one which may be regarded as the actual and proven cause.

The classic studies of Miller on the micro-organisms of the human mouth, his experimental investigations of their activities, and his production of artificial caries outside of the oral cavity, caries absolutely indistinguishable from the natural disease, have disarmed skepticism and established the claims of his theory. Two distinct stages are observed in this disease: First, decalcification or softening of the tissue; and, second, dissolution of the softened residue.

The former is produced by acids, chiefly lactic, liberated by fermentation of food-particles in the mouth.

The dissolution of tissue is the effect of a digestive action upon the albuminous basis of the tooth-substance, which digestive or peptonizing action is produced by bacteria. Strictly speaking, caries is not a *putrefactive,* but a *digestive* process. Now, the quantity and strength of the acids liberated by the fermentation produced by micro-organisms depends entirely upon the chemical constituents of the food.

To quote, "It is not difficult to determine the source of the acids which effect the decalcification; they are derived chiefly from particles of amylaceous and saccharine substance which lodge in the retaining centers and there undergo fermentation. . . . Inasmuch as the fermentation of carbohydrates gives rise to the production chiefly of lactic acid, and since lactic acid, even in dilute form, speedily acts upon tooth-tissue (decalcifies it), there can be little doubt that the acid reaction and the decalcification of the dentin are produced in great part by this acid." Now as to food.

That the carbohydrates sugar and starch are the leading source of acids in the mouth is a chemical certainty. Miller "considers starch and amylaceous substances more detrimental to the teeth than sugar, as sugar, being readily soluble, is soon carried away or so diluted with the saliva as to be rendered harmless, whereas amylaceous matter adheres to the teeth for a greater length of time, and consequently manifests a more continued action than sugar."

A dentist in Leipzig discovered that the teeth of bakers were so much worse than those of any other class of people that in many cases he had been able to deduct the calling of a patient by the condition of his teeth.

The only individuals who could bear comparison with bakers were a few confectioners' children; their teeth, however, were not in quite so bad condition.

On the other hand, Miller states as the result of experiments that "fermentable albuminous substances mixed with saliva develop but small quantities of acid, which soon disappear.

"They are not injurious to the teeth, even though retained for some length of time; they may even retard the progress of decay by neutralizing the acid through their alkaline products." Again he says, "Above all, the conception that albuminous substances (meat) putrefying in the mouth produce acids is totally erroneous." Cookery he finds predisposes foods to fermentation.

This, then, is the dental argument against a vegetable diet.

No caries without acid.

Starch and sugar reactions especially acid.

Meat reaction alkaline.

The teeth of Greenlanders, who subsist solely on meat, are almost entirely exempt from disease. Dr. Edison, of this city, who spent several years as a missionary in Northern Alaska, tells me that in a community of five hundred natives but *two cases* of toothache occurred during a period of two years' residence among them, and these two cases were of women who had forsaken the diet of their people (meat and fish, occasionally varied with a few frozen berries) for the habits and sugar of the whites.

Furthermore, having examined with reference to their teeth upward of one hundred skulls in the native burial grounds (where aerial sepulture is practiced, and the remains eventually tumble to the ground), he *never found a decayed tooth.* Be it noted that they are as a rule much worn from the constant chewing of skins to soften them.

Dentistry in that region remains in the hands of the hoodoo doctors, who charm away the pain, or, as the Christian Scientists put it, "teach mortal mind its errors."

Our next stage in the degeneration of the human teeth is

CIVILIZATION.

The exchange of the wild, free life of the savage for the unhealthful surroundings and generally unnatural habits of modern civilization has effected a great change in physical structure as well. In some directions we have advanced, in others retrograded. While in strength of back, for instance, the aboriginal is superior to the civilized man, in strength of grip he is weaker. Most of our special senses have become blunted, our endurance is lessened, and, above all, the various tissues of the body have degenerated. The testimony of the English in the Soudan as to the necessity of killing the wounded Dervishes is a case in point. Injuries that would send a white man promptly to the hospital or to his grave seemed only to stimulate these natives to renewed effort. Similar results are reported in Cuba and in the Philippines.

Having examined the skeletons of many aboriginal tribes, I find that the one great distinction between their bones and those of modern whites is *their superior quality.*

That this degeneracy has extended to the teeth is proven.

The third upper molar, large, perfect, and three-rooted in the Australian, is frequently smaller and with confluent roots in the Pueblo or sedentary Indian tribes of America; it is *normally abnormal* in the civilized white, while among the descendants of the oldest civilization the world has ever known—that of India—the third molars never erupt in fifty per cent. of the population.

Again, as I have demonstrated in a previous paper,* the absolute size of the lower jaw is greater in savages. Of nineteen aborigines, including seven North American Indians, one African and one American Negro, six Malays, and five Australians, all with beautifully perfect teeth, the mean weight of the jaw was 102.4 grams. Of eighteen white males the mean weight of the jaw was only 83.4 grams. Yet the weight of the skull was nearly alike in both classes, being 690.9 grams for the aborigines as against 685. grams for the whites. The weight of the lower jaw compared with that of the cranium, or the *Cranio-Mandibular Index,* as I have termed it, is 15.6 for aboriginal men as against 12.16 for white men. It is *46.2* for Anthropoid apes, our nearest living relatives among mammals.

Does not this prove a progressive degeneracy in the masticatory apparatus of civilized man?

The greater frequency of caries in civilized races, both ancient and modern, has been proved by the observation of Mummery and the late gifted Patrick; the former also noted its preponderacy in vegetable-eating over meat-eating tribes.

So much for caries.

The only way in which civilization, apart from dentistry, has exerted a retarding influence over this, the most prevalent of all diseases, has been by the introduction and universal popularization of the use of tobacco. For tobacco kills the bacteria of the mouth.

Regarding pyorrhea alveolaris, it is well known to be peculiarly a disease of civilization. Although, strictly speaking, not a disease of the teeth, but of the alveoli and their contained periosteum, it reacts upon the teeth themselves. Not only domesticated animals, but wild animals kept for any length of time in captivity, and particularly if fed on farinaceous foods, sugar, and potatoes, show signs of its presence.

EXTRACTION OF TEETH.

Besides the treatment and cure of diseases affecting the teeth and surrounding tissues, dentists are called upon to extract teeth for various causes.

We have reason to believe that the extraction of teeth antedates diseased conditions of these structures by many years, and that the first patients were unwilling ones. I will briefly outline this practice, as gleaned from the writings of Herbert Spencer, Professor Flower, and many anthropologists and travelers.

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*"A Cranio-Mandibular Index." Proceedings of the Association of American Anatomists, 1897.

The real, serious business of life of the savage is fighting. Any intrusion of an alien upon tribal territory is promptly resented. What with blood feuds and wife stealing and the making of prisoners, those "good old times" were as lively as the coming modern European Peace Congress threatens to be. The warrior then, as now, was the popular hero; the most successful warrior became chief, just as we made General Grant president after the Civil War, and are anxious to give Dewey the same honor. The warrior of a tribe naturally strove strenuously for supremacy, with its great prize of chieftaincy, often bestowing absolute power upon the possessor, as well as wealth, the choice of the marriageable women and of slaves. As battle was waged solely by hand-to-hand combat, the supreme warrior was he who killed the most men. But battles were frequently fought far from home; the bodies of the slain could not be carried such distances, and yet proofs of the number killed were required.

Origin of Trophies.

Hence arose the taking of trophies, or parts of the dead.

Of these the head was a popular, because convincing, trophy. Many people, as the head-hunting Dyacks of Borneo, certain tribes of Northern India, the Fijis, and others, collected these ghastly relics, and the houses of the chiefs and of leading warriors were, and in places are to-day, veritable Golgothas.

But, as Spencer says, "the head of an enemy is of inconvenient bulk, and when the journey home is long there arises the question, cannot proof that an enemy has been killed be given by carrying back a part only? In some places the savage infers that it can, and acts on the inference. This modification and its meaning are well shown in Ashantee, where 'the general in command sends to the capital the jaw-bones of the enemies slain.' When first found the Tahitians, too, displayed in triumph their dead foes' jaw-bones, and Cook saw fifteen of them fastened up at the end of a house.

"Similarly, in Vate, where 'the greater the chief the greater the display of bones,' we read that 'if a slain enemy was one who spoke ill of the chief, his jaws were hung up in the chief's house as a trophy.' . . . A recent account of another Papuan race inhabiting Boygu, on the coast of New Guinea, further illustrates the practice and also its social effect. Mr. Stones writes of them as returning in triumph with the heads and jaw-bones of their slaughtered victims, the latter becoming the property of the murderer and the former of him who decapitates the body. The jaw-bone is consequently held as the most valued trophy, and the more a man possesses the greater he becomes in the eyes of his fellow-men.' Add that in South Africa some tribes of Tupis, in honoring a victorious warrior, 'fasten the mouth (of his victim) upon his arm like a bracelet.' "

The teeth also also were valued as trophies, and in all parts of the world they have been preserved as souvenirs of the slain.

"The Caribs 'strung together the teeth of such of their enemies as they had slain in battle and wore them on their legs and arms. The Tupis, after devouring a captive, preserved the teeth strung in necklaces.'" In Ashantee a similar practice prevails. Kipling's tribal singer of the Neolithic Age, having killed a couple of critical rivals, remarks,—

"Then I stripped them, scalp from skull, and my hunting-dogs fed full,
And their teeth I threaded neatly on a thong:
And I wiped my mouth and said,
'It is well that they are dead,
For I know my work was right and theirs was wrong.'"

Evolution of Badges.

The desire for trophies, extending to those who were unable to win them in battle, explains the origin of badges.

Thus the English in their war with the Ashantees found small golden miniatures of the jaw-bones already mentioned worn by many who were not warriors. From the taking of a head, victors ended by taking only the scalp. As the scalped were not necessarily all slain, but in some cases only conquered, the absence of the scalp, and eventually a shorn head, became the distinctive badge of the slave. This has extended in our own time to prisoners.

So, too, arose the custom of extracting the teeth from living captives, who thus became distinguished by the absence of incisors. From the slave to the dependent is not far, and therefore we are prepared to learn that dependents, from having these teeth removed by force, gradually submitted to the inevitable and extracted them personally as a token of allegiance to their savage superior. Now witness the result. The science of religion is no exception to the rule that the complex is derived from the simple; it is a result of evolution. Beginning as a belief that the ghost of a departed ancestor haunting the place of burial or the familiar scenes of his lifetime could give advice and the like, the multiplication of these spirits of the dead comes to include those of enemies as well. The friendly spirit of the relative is asked to intercede with the hostile one, or the latter is propitiated. But the conception of a God in all races has been that of a more or less powerful, because unseen, but essentially *human* double, with all the attributes of humanity,—hunger, thirst, pain, anger, and the like.

The custom of preparing food for the dead is a very ancient one, and sacrificial offerings are thereby explained. That the God—that is to say, the deified ghost—partook of this food and drink was a belief carefully nurtured by a class of men who gradually arose, claiming to have powerful influence with the God (and surreptitiously appropriating the viands). The propitiation of the ghost was attempted by precisely the same means that would have been employed had he still lived. Thus came about the curious custom of removing one or more of the incisors as a religious ceremony. When the native Australian youth arrived at puberty he was both circumcised and operated upon dentally, one of the median incisors, usually the right, being removed. He was then ranked as a man, and commonly made haste to prove his bravery and entire emancipation from childish sentiment by killing his mother.

The Sandwich Islanders and others removed these teeth as a propitiatory sacrifice to the spirits of the dead.

And by some unknown analogy the New Zealanders, when discovered, "carried suspended by slits in their ears, among other things, the nails and teeth of their deceased relations." Here the mourner becomes a patient. But a religious observance long continued comes to lose its original significance. The ceremony remains though its origin is forgotten. The pious "God be with ye" of our forefathers has become shortened into the curt "good-bye." The arrangement of panels and muntings in a door to form an inverted cross was primarily a reminder of the cross placed upon the doors of the Jewish houses during the time of Pharaoh, indicating that the first-born of that family was to be permitted to live—to be *passed over*.

Thus we learn that what began as a ceremony of profound symbolic meaning often degenerates into a mere custom or fashion, and we find this custom of extracting the front teeth retained by certain tribes as a *mode*. As they truly remark, it differentiates them from the wild beasts. This custom may have originated independently in some tribe, ruled by a chief who had lost these teeth through accident or age, by that implied flattery of the ruler which consists in simulating his personal peculiarities. This trait is universal.

Now as to the dentist himself.

As diseases were originally ascribed to the malevolence of the ghosts of the departed, cures were effected by exorcising or antagonizing these bad gods or demons.

Spencer says "we see that the modes of dealing with ghosts, broadly constructed as antagonistic and sympathetic, initiate the distinction between medicine-man and priest."

In point of time the medicine-man takes precedence; then we find both functions united in the same individual, and as civilization advances a permanent separation of the two professions takes place.

The signature of the modern prescription, ℞, "Jove aid us," is a survival of this dual function, and I am not sure that the penchant displayed by dentists for the ecclesiastical white necktie is not another souvenir of the day when they could write D.D. as well as D.D.S. after their names.

I must leave the evolution of the patient at this point, when *cosmetic dentistry*, one of the oldest methods of personal adornment, had thus begun to appear as a survival of mutilations.

A FEW CONSIDERATIONS IN FILLING TEETH.

BY C. N. JOHNSON, L.D.S., D.D.S., CHICAGO, ILL.

(Concluded from page 633.)

THE INSERTION OF GOLD IN OCCLUSAL CAVITIES IN BICUSPIDS AND MOLARS.

THE plan of building these fillings varies somewhat according to the extent and form ot the cavity. A narrow deep cavity calls for an arrangement of the pellets of gold different from that of a broad and comparatively shallow cavity. In the narrow cavity the entire area of the pulpal wall or seat may be covered by the first piece of gold inserted so that it is wedged between the surrounding walls, and the filling may grow from this in regular layers at right angles with the long axis of the tooth till the cavity is full. In a broad cavity this is not practicable. The filling must be started in one extremity of the cavity and carried across the pulpal wall pellet by pellet, till a sufficient number have been placed to reach from one perpendicular wall to another.

The idea in fastening these fillings in position against possible dislodgment is to securely lock the gold between the surrounding walls of the cavity and into the angle formed by the junction of these walls with the pulpal wall or seat. If these angles are formed on correct mechanical principles and the pulpal wall is made flat, as suggested in considering cavity preparation, the gold may be inserted with the greatest facility and the filling anchored beyond the possibility of displacement under stress of mastication. The wear on these fillings is often very severe, and the gold, in order to do the most permanent service, must not only be perfectly adapted to the walls, but must be made dense and hard. As has already been stated, the hardness of gold can be largely increased by continued malleting, even after compactness has been reached, and in the insertion of these fillings the operator should take advantage of this fact in order to secure as perfect a wearing surface to his fillings as possible. As the last pieces of gold are added the malleting should be carried somewhat beyond the point of compactness, until the operator can detect a hard, metallic ring to the surface of the filling. This does not imply prolonged or injudicious hammering on the gold to the injury of the peridental membrane or the enamel-margins. Care should be exercised not to go beyond the necessities of the case, but the idea should be ever present that these fillings, of all others, require the greatest density and the highest degree of resisting power.

If an operator will consider carefully the amount of aggregate service which such a filling is likely to be called upon to perform in the course of its allotted life, he will be more seriously impressed with the necessity for the greatest care and thoroughness in its condensation. The repeated impact in the process of mastication aggregates enormously in a single year, and a filling inserted in the mouth of an individual of early or middle life with an expectancy of twenty, thirty, or even forty years' service must needs be of the highest order of excellence to meet the requirements. It has been estimated that in the proper mastication of an ordinary meal an individual will make at least one thousand occlusions. Supposing that the force of one-half or even one-fourth of these falls on a certain tooth, the number of impacts on that tooth in the course of a twelvemonth is seen to be very great. Multiply this by the number of years such a tooth is likely to be called on for service, and the sum becomes well-nigh appalling. The force of these impacts varies in different mouths, and there is also a considerable range in the degree required for the comminution of the different kinds of food material in the same mouth; but the lowest force necessary for ordinary mastication is at least great enough to become an important factor in determining the degree of density required of a filling against which it is brought to bear.

In an extended study of the greatest possible force that could be exerted by closure of the human jaws, Dr. G. V. Black found that upon the molars it ranged from twenty-five pounds to three hundred pounds, and that the force in common use in mastication was greatly in excess of preconceived ideas on the subject.

Suppose, then, a filling on the occlusal surface of a lower molar with the cusp of an upper molar occluding directly against it, and this filling at each meal receiving the impact of the upper cusp crushing food-material between it and the filling at the rate estimated, it will readily become apparent that to do permanent service the material of which the filling is made must be capable of withstanding considerable wear.

The reason that many fillings of poor structure have been known to save teeth for years is accounted for in the fact that they have been so situated with relation to the opposing tooth that the particular filling in question has not received the full force of masticatory usage, but such a possible contingency as this should not deter an operator from making his fillings uniformly of the highest degree of excellence. If we could have the record of all the fillings which have failed as the result of imperfect condensation, and place it beside the number of such fillings that have succeeded, the evidence would be overwhelmingly in favor of dense fillings.

Insertion of gold in occlusal cavities on lower molars.—Usually these cavities are so large in area that the gold must be started in one extremity of the cavity and carried across the pulpal wall toward the other extremity piece by piece, instead of wedging from one wall to the other at the beginning. Fillings of this character should ordinarily be started in that portion of the cavity most remote from the operator, and built progressively toward the wall nearest him. A rope of non-cohesive gold should first be carried into the angle formed by the junction of the distal wall of the cavity with the pulpal wall or seat, and into this non-cohesive gold should be forced a cylinder of cohesive gold and the whole mass driven to place with hand pressure, followed by the mallet. The cohesive cylinders should now be added one after the other, with their sides against the mass of gold already in place, and each cylinder condensed by mallet force over its entire surface. The ends of the cylinders should look toward the pulpal wall and the occlusal surface of the filling, except that as the filling is being built forward the portion near the pulpal wall should be slightly in advance and extend farther toward the mesial than that at the occlusal surface. This presents an inclined surface of gold to the operator against which the plugger point may have a direct bearing, and the cylinders should be laid with their sides upon this incline. Each cylinder should be long enough if possible to reach from the pulpal wall to the extreme elevation of the occlusal surface of the filling.

As the point is reached where the cavity widens out buccally and lingually between the mesial and distal cusps, care should be exercised to wedge the gold securely into the angles formed by the junction of the pulpal wall with the lingual and buccal extremities of the cavity. These portions of the filling are sometimes lifted out of place by the use of adhesive materials such as sticky candy, etc., unless the precaution is taken to so deepen the cavity at these points as to afford ample retention, and then condense the gold firmly into place.

There are two points from this to the completion of the filling which demand especial attention,—the wall which looks toward the mesio-lingual cusp on left lower molars and the mesio-buccal cusp on right lower molars, and also the mesial extremity of cavities on either side of the mouth. Unless the operator be very cautious, these places will be bridged over and the filling fail of perfect adaptation and density. As has already been intimated, the difficulty of approaching these walls by mallet force on the left side of the mouth may be largely overcome by operating from the left side of the patient, but on the right side there is no alternative except to use curved pluggers and pull the gold into position.

When the walls are protected and the filling built flush with the masticating surface, the entire area of exposed gold should be thoroughly malleted to perfect density. This may be done with pluggers of shallow serrations or no serrations at all, and the final blows of the mallet should be struck along the margins of the filling.

Insertion of gold in occlusal cavities in upper molars.—These cavities are usually of such an area that the first piece of gold inserted may be made to cover the entire pulpal wall so as to wedge between the surrounding walls. A non-cohesive rope of sufficient size to fill about one-third of the cavity should be used to start the filling, and into this the cohesive cylinders may be interlaced till the two forms of gold are locked together. When the filling is nearly completed the cylinders should be carefully laid in regular layers, with their sides upon the filling already in place and condensed with pluggers having shallow serrations, to the end that the surface of the filling may be made uniformly dense and even.

In those long, narrow fissure cavities, such for instance as those which follow the disto-lingual groove, the filling should be started in one extremity of the cavity and built progressively across to the other extremity, but the same principle of wedging the gold between the two lateral walls of the cavity should be followed throughout. The fact should never be lost to view that in the insertion of all gold fillings, no matter where located, the prime requisite for success is adaptation of the gold to the walls. This is more important, if possible, even on these occlusal surfaces, than a high degree of density, and yet the thorough and careful operator will not stop short of securing perfect adaptation and high density.

Insertion of gold in occlusal cavities in bicuspids.—The most difficult fillings to insert successfully on any of the occlusal surfaces are those in the small round pit cavities sometimes found on lower bicuspids. They appear to be the simplest possible form of cavity to fill, and yet they really demand a higher order of skill than cavities of much larger area. Unless the cavity have well-defined angles and a flat pulpal wall the gold has a tendency to roll under pressure, and there seems to be an especial difficulty, particularly with beginners, in securing good adaptation to the walls of these round holes. Then in some instances the occlusal portion of the filling is inclined to loosen as the final malleting is being done and come away from the gold in the depth of the cavity, leaving a little peg of gold to which it seems almost impossible to attach any fresh gold.

The proper method of inserting these fillings is to use a mass of non-cohesive gold of sufficient size to fill at least one-half of the cavity, and force a round plugger slightly less in area than the cavity into the center of the mass and wedge it in every direction with hand pressure wielded in the swaying motion before referred to. This leaves a depression in the middle of the filling, with some non-cohesive gold standing up against the surrounding walls of the cavity. A small cylinder of cohesive gold should now be wedged into the depression in the non-cohesive gold with hand pressure, and the whole mass forced in all directions,—toward the pulpal wall and against the surrounding walls. The pressure should be very vigorous, but the manipulation must not be kept up too long through fear of overworking the surface and rendering it difficult to attach more gold to it. Most of the filling should thus be built up by hand pressure on the wedging principle, and the mallet used only on the immediate surface. If this plan be followed the operator will secure good adaptation to the walls through the medium of the non-cohesive gold, and the two kinds of gold will be so wedged or interlaced together that the surface of the filling will not flake off.

In cavities long and narrow, such as are ordinarily found on upper bicuspids and on lower second bicuspids, the method of inserting the gold is the same as for similarly formed cavities on molars. The gold should be started in the distal region of the cavity and built across to the mesial. The point in these fillings requiring especial care in adaptation is in the angle formed by the junction of the mesial with the pulpal wall. Unless the operator watch this angle carefully, he will be likely to bridge the gold over it and leave an imperfection in the filling.

Finishing gold fillings on the occlusal surfaces of bicuspids and *molars.*—As soon as the filling is thoroughly condensed it is ordinarily well to remove the rubber-dam before finishing. The operator should make it a rule not to encumber his patient longer than possible with this necessary but disagreeable adjunct to the operation, especially in view of the fact that these fillings can usually better be finished without it. The most effective means of dressing the filling to form is by the use of corundum stones in the engine, and these should invariably be kept moist to facilitate the cutting of the stone and to prevent heat. The form of stone best adapted for most cases is the wheel, and they should range in sizes from a very large, thick wheel to a small, narrow form to meet the varying cases presented. Care should be taken to test the occlusion by repeated closure of the teeth, to be assured that the filling is not left so high that an opposing cusp impinges too hard upon it.

When the filling is ground to the desired form it will be found that the stone has left its surface covered with scratches, which must be removed in order to give it a finished appearance. This may ordinarily best be done with moistened pumice carried on a moose-hide, leather, or rubber wheel, and when the filling is perfectly smooth some whiting may be substituted for the pumice and a bright polish given the surface.

In certain cases these occlusal fillings may be finished to advantage with sand-paper disks by tipping the disk at an angle and compressing it into place with a ball burnisher. In fillings of narrow area situated in depressions between cusps it is often difficult to reach them with stones without cutting the surrounding enamel. In these cases small finishing burs may be used with short, sharp blades to dress the filling to form, when it may be polished with pumice and whiting on wood points carried in the engine. In other cases these fillings may be advantageously reached by winding a short finishing strip on a small slot mandrel in the engine.

INSERTION OF GOLD IN BUCCAL, LABIAL, OR LINGUAL CAVITIES.

The same principles of inserting the gold apply to these cavities that have just been advocated for occlusal fillings,—viz, in all cavities of sufficiently limited area the first piece of gold inserted may be made to cover the entire pulpal wall and wedge between the surrounding walls, and the filling built up in regular layers parallel with the pulpal wall, while in cavities too extensive for such an arrangement the gold must be started in an extremity of the cavity and built across the pulpal wall piece by piece toward the other extremity. In either case the chief requisites relate to perfect adaptation to cavity walls and a reasonable degree of density to the gold. As the surface of the filling is approached the aim should be to lay the cylinders on in a regular order, so as to obtain as nearly as may be an even surface which will not demand much cutting to finish it.

There is one point in the insertion of these fillings which calls for especial attention,—the cervical enamel-margin. Great care should be exercised as the filling is being inserted to adequately protect the margin without building a large mass of gold over it.

The slightest deficiency of gold at this point jeopardizes the operation and mars an otherwise perfect filling, while a great excess of gold leads to a peculiarly irksome procedure in its removal. The operator therefore should study carefully the outline of the cavity as he is inserting the gold, and should aim to reproduce the original form of the tooth with just sufficient excess of gold to make certain of a perfect finish. A little extra care at this stage of the operation will save much time and annoyance subsequently.

Finishing the filling.—Usually the most effective means of dressing these fillings to form is to employ a sand-paper disk in the engine, and for the proper approach of the disk it is ordinarily necessary to remove the clamp. But in every instance where possible the rubber-dam should be left in position till the filling is finished, for the purpose of keeping blood and saliva away from the disk, and also to afford protection to the gum and avoid its laceration. The dam may be held back so as to expose the filling with the fingers of the left hand, or by a hand instrument with its point pressed against the surface of the tooth rootwise of the cervical margin of the filling. The disk should be smeared with vaseline or some suitable lubricant to prevent heating the filling, and also to allow it to play freely against the rubber-dam without cutting or catching in it and rolling it up.

When the filling is dressed to the proper form a beautiful polish may be given it with a cuttlefish disk or with a small rubber cup on a mandrel carrying pumice, followed by whiting. Care should be exercised in finishing these fillings to avoid as largely as possible any undue laceration of the gums. Some slight irritation of the free margin of the gum is often unavoidable, and need not be considered serious, but when the gum is badly cut or torn it is not always reproduced in as perfect a condition as it originally was, and the healing is sometimes a slow and discouraging process. With ordinary precaution the gum may be so protected from injury as to entirely recover from the operation in a day or two, and lap over the cervical portion of the filling in a healthy pink condition.

Note by the Author.—When these articles first began in the Dental Cosmos it was merely with the idea of publishing a few practical magazine papers which might be of some small benefit to magazine readers, and not with any well-defined idea of book publication. In all sincerity the author felt himself inadequate to the task of writing a book upon so important a subject, and shrank from the responsibility which such an undertaking involved. But that which appeared to him in the light of a too daring venture would seem to have impressed others as the perfectly natural order of events, and shortly after these articles began to appear he received so many letters from members of the profession, from publishers, and from students asking him to gather the series under cover in book form, that he eventually gave serious thought to the matter. He realized that the articles as published in the Dental Cosmos would not serve for book publication short of considerable revision and rearrangement, and it is to this task that he has finally committed himself. It must also be apparent that a book on the subject should contain matter not touched on in a series of magazine articles without extending them beyond the limits of patience. The present articles have run for twelve months,—an all-sufficient tax on the readers of the magazine, and particularly on the long-suffering editor. It is with sincere thanks to both that the author concludes them. C. N. J.

A REVIEW OF DR. WILLIAMS'S PAPER, "A CONTRIBUTION TO THE BACTERIOLOGY OF THE HUMAN MOUTH."

BY A. K. FORT, D.D.S., ATLANTA, GA.

(Read before the Georgia State Dental Society, June 13, 1899.)

THE recent articles of Dr. J. Leon Williams contained so much of interest to the dental profession that I venture to review his last paper on oral bacteriology, and its discussion, with the hope that by some practical illustrations I shall be enabled to make plain to the casual reader those points of difference over which there is so much contention.

From the large class among us who are not interested in bacteriological research I ask indulgence, but from those of ripe experience and close clinical observation, who are seeking the truth, I invite the freest analytical criticism.

The paper to which I wish to call your attention especially was read before the New York Odontological Society on January 17, 1899; and it was most unfortunate that Dr. Williams was unable to be present to read his paper, as a study of the discussion thereon plainly demonstrates.

Dr. Barrett, in opening the discussion, said, "It is worthy of more consideration than can possibly be given it at this time;" and, after reading the discussion, one is quite prepared to agree with him. If the author had been present he would have been able to clear up some points that did not seem to be familiar to some of those present, and to call attention to those misrepresentations of his statements that were made on that occasion.

The following quotation appeared in one of Dr. Williams's recent papers: "I took the firm, unwavering resolution never to accept anything for truth which I did not clearly know to be such; that is to say, carefully to avoid precipitancy and prejudice, and to comprise nothing more in my judgment than what was presented to my mind so clearly and distinctly as to exclude all ground of doubt."

Taking the above as a motto, I refused to believe the statements found in his paper until I had been over the ground myself and proved to my own satisfaction that they were true. The results of my experimentation, with the method illustrated practically, I shall endeavor to present to you.

In the beginning let me say that there is nothing original in these experiments, since they have been familiar to bacteriologists for a long time; but they may yet be of benefit if they serve to dissipate that vagueness of conception in regard to the generation of the acids of decay that is still prevalent in the minds of some. Dr. Miller proved twelve years or more ago that the dissolution of the teeth was brought about by the action of acid-forming organisms, but he did not prove that the bacteria were responsible for the inception of the process. This point was taken up by Dr. Williams several years ago, and carried to completion by the demonstration of the acid-forming germs adhering tenaciously to the enamel in incipient caries. There are still a few, however, or have been until the appearance of Dr. Williams's last contribution, who contend that the micro-parasites that he has shown attached to the enamel of the teeth have not been proved to be acid-producers, since they consisted entirely of leptothrix threads, and were therefore not the micro-organisms of caries. Dr. Williams replied to this by dismounting some of his slides and teasing away some of these gelatinous masses of organisms attached to the enamel on a cover-slip, thus demonstrating the presence of numerous forms of bacteria, most of which were known to be acid-producers. In fact, it is not necessary to resort to the microscope to demonstrate the great variety of organisms found in these gelatinous masses, as the plates prepared from this material show. It is easy to distinguish the different kinds by their shape, color, etc., since the colonies of the same species of bacteria, under the same conditions and on the same medium, vary very little. That most of these colonies are acid-producers is shown by the test-tubes of litmus bouillon containing glucose, which were originally slightly alkaline and consequently blue like the sample tube. These tubes were inoculated from the various colonies of the plates, and have turned red as a consequence of the growth of these germs producing acid.

Whether the leptothrix threads attached to the enamel are acid-producers or not does not in the least disprove Dr. Williams's position, since these other forms that I have shown you and that are acid-producers are found in the same location in great abundance. He is at present working on these acid-producing organisms, and we may expect to have more light thrown on this subject soon. In his last communication he mentions three forms as tested so far, and in regard to them says, "Two of these, Staphylococcus pyogenes aureus and Staphylococcus pyogenes albus, are forms which I should least have suspected to be concerned in the production of the acid of decay, and they show very marked powers in this direction."

In regard to this point it is only necessary to give some references: Dr. Ferdinand Hueppe's "Principles of Bacteriology," published in 1895, and whose English translation has recently appeared. In the chapter on cycles of activity and adaptation, page 139, he says, "The yellow-pus coccus, Staphylococcus pyogenes aureus, forms a golden-yellow pigment, induces suppuration, and in sugar solutions produces lactic acid." Muir and Richtie's "Manual of Bacteriology," page 148, also testifies to the acid-producing power of the pyogenic staphylococci. Sternberg's "Bacteriology," published in 1893, page 267, also testifies to this property of "Staphylococcus pyogenes aureus when cultivated in media containing glucose or lactose, while ammonia is also one of the products of its vital activity."

The above is sufficient to show that the acid-forming power of the pus cocci has been known for some time, and yet in the discussion of this paper one of the gentlemen says in effect, "We have not usually considered the pyogenic microbes as acid-producers," and that it was news to him.

Dr. Williams says further, "I incline to the opinion that these two forms are to be found in a much larger percentage of mouths than the records of some of those who have studied this subject would indicate;" and he also says, "I am therefore disposed to agree with Dr. Black in the opinion that they might be discovered in almost all mouths if sought for with sufficient care."

The opinions of Drs. Black and Williams are supported by most investigators in this line. Indeed, the frequent occurrence of these forms in the mouth is what one might expect from a study of their normal habitat. For instance, Sternberg, page 265, says, "Staphylococcus pyogenes aureus is a facultative parasite, and it is the most common pyogenic micrococcus found in suppurative processes generally. But it is also a common and widely-distributed saphrophyte, which finds the conditions necessary for its existence on the external surface of the body and of most mucous membranes." Hueppe, quoting Miller, page 168, says, "In association with the process of caries or decay of the teeth are found all possible kinds of pyogenic germs." In view of the acid-forming power of these organisms and their frequent occurrence in the mouth, they probably play a more important part in the production of caries than has been generally supposed. I have found the pyogenic forms in four out of five mouths that I have recently examined with no special intent to look for them. The plates will show colonies of Staphylococcus pyogenes aureus and Staphylococcus pyogenes albus which were obtained from the gelatinous plaques on the enamel. Tubes of litmus-glucose-bouillon inoculated from these colonies show the acid-producing power. In regard to Sarcina lutea, the other form reported upon by Dr. Williams, its acid-producing power is weak, as it only shows the acid reaction after several days. Sarcina aurantiaca I found to be much more active, as the bouillon was turned red after twenty-four hours. Both forms are sometimes found on the teeth, and I have several times found lutea in disintegrated dentin.

Further proof of the number of acid-producing organisms attached to the teeth than has been furnished by Drs. Black and Williams is not necessary. There is another phase of the question, however, suggested by Drs. Williams and Miller, and stated in the April DENTAL COSMOS in these words, "From facts in our possession it seems highly probable that an exhaustive examination of cultures of micro-organisms of the human mouth would show that most if not all of them will give an acid reaction when grown in certain media, although some of them may give an alkaline reaction when grown in other media." "A verification of this opinion would go far toward explaining the observed fluctuations in the process of caries as seen clinically and also shown in microscopic specimens."

This suggestion met with considerable resistance from some very able men, and it was very unfortunate that Dr. Williams was not present to discuss the point. That this double function is possessed by some forms of mouth bacteria, and that an organism can produce an acid reaction in media containing sugar and an alkaline reaction in media without sugar, I firmly believe, and submit the following, though, so far as I can find, experimental evidence in regard to mouth bacteria is rather weak and contradictory; though, to be sure, one would expect this peculiarity in the effort of the bacteria to adapt themselves to their environment. Miller touched upon this, and he instanced a bacterium that produced a neutral reaction in the presence of one-tenth per cent. of sugar, while the reaction became acid on increasing the quantity of the sugar and alkaline on reducing it. I have isolated several forms that after the first twenty-four or forty-eight hours turned red, tubes containing one-eighth per cent. of glucose; but after the expiration of a number of days the tubes again became blue. The bacteria in these cases evidently split up the sugar first into acid, but after the sugar had given out they attacked the proteid substance, with consequent production of sufficient alkali to neutralize and overbalance the acid generated at first. The tubes demonstrate this property very nicely, and you can see a marked difference in color between those that have been inoculated for only a few days and those that have been inoculated for some time.

Another experiment was made as follows: A series of tubes containing gradually-decreasing percentages of glucose was inoculated with a pure culture from the gelatinous plaques. These tubes were supplemented with tubes without any glucose at all, so that any change in reaction would be indicated by a change in color one way or another. I found one organism which grew as a transparent film on agar that turned red a tube containing only .01 per cent. of glucose, while the tube without glucose gave no change of color. One was found, a coccus that developed a rather tenacious zooglea, that gave the acid reaction in the presence of .02 per cent. of glucose and no change in the tube without glucose, while two organisms were found that gave the red color in tubes with glucose, while in tubes without glucose they gave the blue color or alkaline reaction. I have brought two tubes of each series in order to show how the media influences the result of bacterial action. Bearing on this point is the assertion on page 267, Sternberg's "Bacteriology," in reference to the lactic acid fermentation produced by Staphylococcus pyogenes aureus in media containing glucose or lactose, while ammonia is also one of the products of its vital activity. Indeed, ammonia is one of the final products of the decomposition of organic bodies in general, whether this decomposition is brought about by the action of a pure culture or of a whole series. Since it is well known that the sub-stratum exerts great influence on the action of bacteria, it should not be a matter of surprise that this double function does occur in the mouth. The evidence is sufficiently plain that Dr. Williams's assumption was correct, provided my cultures were pure, and so far as I could tell by a microscopic examination they were. I was careful in isolating and transferring to try to avoid the accidental entrance of other species. Hueppe, however, cites the following, that bears on this subject: "Naegeli observed, as Pasteur had done before him, that milk that has been heated does not afterward become acid, but, on the contrary, alkaline; and he assumed that the germ that produced acid had been so modified by the heat that its ferment nature had undergone metamorphosis." He further says, "My own investigations have made the following point clear, namely, that the germs producing acid are actually destroyed by the heat, but that resistant spores of other species of bacteria are present along with them in the milk; and that these spores resist the heat, subsequently germinate, and thereby render the milk alkaline and bitter." This possibility of more than one species of germ being concerned in phenomena of this sort was suggested by Dr. Barrett in the discussion of this point. How far errors of this kind have influenced results obtained along this line it is impossible to say. At any rate, the experimental evidence in regard to bacteria found in the mouth is as yet insufficient to substantiate the assertion that this double function does occur therein to any great extent. Certainly it is a fact that many organisms that cause no change in neutral or alkaline media will, on the addition of sugar, generate an acid. This is well shown by the tubes, which were all of the same blue color originally. Those to which glucose had been added have turned red, as a consequence of the growth of these acid-producing germs. These red tubes can be turned blue by the addition of an alkali, and if kept in the incubator will again turn red, indicating the continued production of an acid. It seems that some of the gentlemen discussing Dr. Williams's paper drew the conclusion that if this peculiarity was possessed by the bacteria, then it would be possible for the pathogenicity of an organism to be changed by the influence of the culture medium. Numerous examples might be given relating to the loss of virulence by pathogenic forms or the acquiring of virulence by harmless saphrophytes, but I will instance only one. "The common bacillus of the colon, Bacterium coli commune, as a rule lives a harmless saphrophytic existence in the intestines, but may also cause serious illness and inflammations, while in sugar solutions it can effect a lactic acid fermentation." The variability of action of the bacteria is tersely explained by the same author from which the above was quoted as follows: "The constancy of those external conditions to which the bacteria must adjust themselves alone determines the uniformity of the effects produced." Further, "Bacteria provoke fermentation only when they come in contact with fermentable substances under proper conditions, and produce illness and disease only when predisposition toward disease exists."

The absence of vital reactivity from enamel emphasizes the necessity of absolute mechanical cleanliness of the teeth, since there is no possibility of that tissue exerting an anti-bacterial influence, as other tissues of the body do. This, of course, does not apply to the environment of the teeth. In discussing the process of caries, one gentleman suggested that Koch's rules had not been complied with. This brought quite a remonstrance from several of those discussing the problem. On this point it is only necessary to call attention to the fact that pathologists have discovered that several diseases can be produced by the same organism, and that several organisms are sometimes concerned in the production of the same disease. That the latter is the case with caries was shown by Dr.

Miller and others, though I do not affirm that caries cannot be brought about by a pure culture. Dr. Williams, on page 349, April Dental Cosmos, says, "I have invariably found a greater variety of micro-organisms in mouths which are comparatively healthy than in those which exhibit some specific form of disease." This is also in line with recent bacteriological investigations. Hueppe, page 118, says, "An antagonism is frequently manifested between pathogenic bacteria and the bacteria of putrefaction." It has been suggested by some bacteriologists that the water supply of cities might be rid of the pathogenic forms by allowing the water to stand for some time in reservoirs, in order that the saphrophytic bacteria might outgrow and kill the pathogenic forms. That this sort of antagonism takes place in the mouth is readily conceivable. The suggestion that the environment influences the pathogenicity is also in accord with recent investigations, and has already been touched upon.

From the standpoint of the dental bacteriologist, the most interesting point in the paper is the description of a newly-discovered organism called Leptothrix racemosa, and the illustration of the marked pleomorphism exhibited by that germ. He makes it very plain that what we have heretofore regarded as several species are all the products of this one thread-like organism. He shows us that the breaking up of the threads and fruit-heads of this germ gives rise to short and long rods or bacilli, diplococci, or round organisms in pairs, zooglea, masses of micrococci, or round forms imbedded in a gelatinous mass like frog-spawn, and various other forms that have no doubt been classified as entirely different species. The problem of pleomorphism of the bacteria has been receiving the careful attention of bacteriologists for some time, and Dr. Williams's paper will no doubt cause quite a revision of the classification of mouth bacteria. Unfortunately I had no access to a photomicrographic apparatus, so that I could not prepare photographs of this interesting organism; but I have prepared quite a number of mounts, and will demonstrate what Dr. Williams has shown in his photographs under the microscope to those who are interested. He shows us that the grayish-white matter that accumulates on the teeth is principally composed of these leptothrix threads, which adhere to the enamel with considerable tenacity, and tells us that this organism is found in every mouth. I myself have examined eight mouths and found it in every case. Dr. Williams did not claim that Leptothrix racemosa was an acid-producer, as some seem to think, as he distinctly stated that it had not been cultivated. The peculiarities of its spore formation and the liability of mistaking these spores for cocci, etc., and also the segments of the threads for bacilli, was the special point brought out. The great variety of forms that may originate from these threads is well shown in the mounts which I have prepared. There seems to be some doubt as to whether this new organism does not represent an unknown stage of development of Miller's Leptothrix innominata, brought out by the method of staining, or is an entirely new germ to the bacteriologists. I incline to the former view, and also believe that it will finally be classed with the pleomorphic moulds. It grows very rapidly on the teeth, as Dr. Williams found the fruit-heads forty-eight hours after a thorough cleansing of his teeth; and I have found it in small amount after eighteen hours. By accident I was able to get a culture of what I took to be this interesting organism, which I was only able to cultivate, however, through two tubes. The mounts prepared from these tubes show the resemblance to the leptothrix forms direct from the mouth. In the culture of this germ I noticed that the fruit-heads were not so compact as those from the mouth, and they were more easily broken up, so that a cover-slip prepared in the ordinary way showed no trace of the basidia whatever. In the culture the sterigmata attaching the spores to the central stalk or basidium were longer, and seemed to be farther apart. It may be that the culture I obtained was not identical with Leptothrix racemosa, but, if so, then there are still other thread forms in the mouth that reproduce by "acrogenous abjunction." This method of reproduction is found in several species of micro-organisms, and in the case of Leptothrix racemosa the fruit-heads somewhat resemble a head of wheat. I was especially struck with the fact that the spores begin to develop into threads before breaking off from the central stem, giving rise to tangled masses of threads. This is well shown by Dr. Williams in the beautiful illustrations in his last paper. The culture of leptothrix that I obtained was in a tube of bouillon which had been inoculated from the mouth after having had fifty per cent. borolyptol held in it for two minutes. This culture transferred to another tube gave a good growth, which was in the form of rather firm zooglea; but on the second transference it failed to develop, and it also refused to grow on the solid media. This limited growth, however, has encouraged me to make still further efforts to cultivate it, since if its complete life history were known it would probably help us to a more satisfactory classification of oral bacteria.

To sum up briefly the results of my efforts to follow Dr. Williams and the discussion of his work:

First. Acid-forming micro-parasites are the exciting causes of caries, the rapidity of the process depending on the cultural and other external conditions under which the bacteria find themselves (Dr. Black's environment), and also on perfectness of structure of the enamel.*

Second. The pyogenic staphylococci are nearly always present in the mouth. They are acid-producers, and exert a peptonizing action also; hence it is possible that they may take part in the solution of the lime-salts, and also in the destruction of the organic matrix of the teeth, as suggested by Dr. Kirk.

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*Recent researches by Dr. S. A. Hopkins seem to indicate that the teeth themselves exhibit susceptibility or immunity to the caries-producing factors. Also, that the prevailing theory held in regard to caries may possibly soon be dislodged. Up to date, however, so far as I am aware, there has been advanced no proof to controvert the statement above. The results of Dr. Hopkins's experiments will be awaited with much interest. In a recent letter he very aptly says, 'We should be in no hurry to assert conclusions." What seems true to-day may not seem so to-morrow, and with a thorough appreciation of this statement, this paper is allowed to go to the publishers.—A. K. F.

Third. It is a fact that some organisms found in the mouth will generate an acid when the culture medium contains sugar, while in media without sugar they do not generate an acid.

Fourth. Experimental evidence is insufficient to prove that any of the bacteria found in the mouth generate an acid in sugar media and an alkali in media without sugar, though some few experimenters have seemingly succeeded in establishing this phenomenon. The possibility of errors being eliminated, it may be taken as an established fact.

Fifth. It is an established fact that a simple saphrophyte or benignant organism, as expressed by Dr. Barrett, may be converted into a malignant or pathogenic one, and *vice versa*. This conversion may take place in the human body, as in the case of the colon bacillus; or it may take place on artificial media, as exhibited by the loss of virulence of the pathogenic forms in the laboratory. The change in every case is brought about by the pabulum and other external conditions. It of course follows, as remarked by Dr. Kirk, that organisms of a given class may be nourished by different kinds of pabula.

Sixth. Antagonism does occur among the bacteria of the mouth as among other forms. This antagonism is manifested in the harmless œco-parasites when the body is in a state of health; that is, when the tissues and fluids of the mouth are exhibiting immunity toward the pathogenic forms. When the mouth is susceptible to the action of pathogenic forms the saphrophytes will be outgrown and the pathogenic form (or forms) will outnumber the saphrophytes; or, what is more in line with recent discoveries, the œco-parasites become converted into pathogenic forms by the change in the pabulum.

Seventh. The specific essence of caries, in the "Kochian sense," has not been described. By this I mean that a certain species of microbe has not been demonstrated to be present in all cases of the disease. Koch's other rules are also included in the phrase "Kochian sense." This was claimed by Dr. S. A. Hopkins, and was derided by several. Again, I point to the fact that Koch's specificity of bacterial disease no longer holds good in all cases.

Eighth. Leptothrix racemosa has not been proved to be an acid-producer, nor did Dr. Williams claim that it was, since he admitted that it had not been cultivated. It is evident, however, that if it is not an acid-producer it enters into an intimate symbiosis with forms that do produce acid. Its pleomorphism is undoubted, but this pleomorphism is not the result of cultural changes. It is found in all mouths. It forms what may be mistaken for micrococci of various kinds, bacilli, and spirilla. Either it is a cultivatable organism, or else there are other thread forms in the mouth that reproduce in the same manner. It reproduces rapidly, and in order to keep the teeth clear of this germ it is necessary to clean them at least every twelve hours.

Ninth. The latest investigations further emphasize the fact that a hygienic mode of life is the most successful way to combat disease. This applies to the teeth as well as to other parts of the body. The great prolificness of Leptothrix racemosa only goes to prove that "mechanical cleanliness is the better half of disinfection," and if we have to rebuild our system of disinfection, as suggested by Dr. Jarvie, the sooner we begin the better.

As a fitting close to the preceding humble effort I submit the following quotation: "Bacteria and other minute pathogenic organisms do not exercise their injurious effect upon man from an inbred wickedness and pleasure in doing mischief, but in the phenomena of parasitism we have to do simply with questions of adaptation, with the utilization of situations, so to speak, which man himself provides by his own sins of hygienic omission and commission, and which therefore he himself is able to remove. We should then revile the malicious bacteria no longer, but take ourselves to task and mend our ways."

SOME OBSERVATIONS UPON THE SEQUELAE OF ADENOID OR LYMPHOID TISSUE IN THE NASO- AND ORO-PHARYNX.

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(Read before the New York Odontological Society, April 18, 1899.)

SINCE the memorable day in 1870 when Wilhelm Meyer* published his classical treatise giving to the world the results of his original researches in the realm of the glandular structures of the pharyngeal vault, and thereby conferring a great boon upon child life, hundreds of articles have been published covering all phases of the subject. Indeed, so many and so frequent have these appeared that one hesitates considerably before attempting to offer a paper even upon some of its more remote relations.

Hackneyed as the subject may seem to the members of this society, those who are so often brought face to face with the resultant conditions, even to retarded mental development, bone deformities, and deaf-mutism, should continue to exhibit the danger signal until all practitioners of medicine everywhere, not excluding your own profession, come fully to realize how dangerous they are to child life. One day's experience in any clinic for aural or nasal diseases will tell a convincing story of the results of disease of these glandular structures.

As this paper has chiefly to do with a short discussion of some of the resultant conditions dependent upon disease of the glandular structures in the naso- or oro-pharynx, it would seem that enough might be said to at least form the basis of an intelligent and helpful discussion.

A concise description of the chain of lymphatic glands found in the naso- and oro-pharynx has been given by Glutsmann,* and I quote his words: "The lymphatic tissue appears in the locality which interests us in this paper, in an aggregated as well as disseminated form, and is distributed uninterruptedly throughout the pharynx and naso-pharynx." "Waldeyer† very appropriately gave it the name of the lymphatic ring of the pharynx." "Its position is almost vertical, and, beginning at the vault of the naso-pharynx with the pharyngeal or Luschka's tonsil, it extends to the orifice of the Eustachian tubes, where we have a larger aggregation of follicles,—the tubal tonsil."

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*Medical and Chirurgical Trans., 1870.

"Turning downward along the posterior edge of the soft palate and around the posterior pillar, it reaches the faucial tonsil and across the base of the tongue called the lingual tonsil," or the tonsil of the tongue.

It must be remembered that these structures are normal to these parts; that in the normal healthy condition they are not visible to the eye, not even the faucial tonsil, and it is only when they become permanently enlarged as a result of disease that they become important factors in producing the many and grave diseases of the surrounding structures.

Disease of these glands is found in all climates and all countries in varying degrees, and there is much variance of opinion as to cause.

There can be no doubt that heredity plays an important *rôle* in causation, enlargement of these glands having been observed in children born even before term. Frequent colds and neglected catarrhs may also be considered as causes. They at least greatly aggravate a case whose tendency is to hypertrophy. It is of course a disease which manifests itself during child life. It is much more common than is usually supposed, and many cases which have sufficient enlargement of the glands to produce serious trouble, especially to the ears, do not manifest the marked symptoms supposed to be characteristic of the disease. To merely mention the symptoms will suffice for the purposes of this paper.

Facial expression, mouth-breathing, restless sleep accompanied by snoring, sucking of air, and occasional stopping of the respiratory act, dead voice, difficulty in eating or nursing, anemia from lack of proper oxygenation of the blood, excessive discharge of mucus or muco-pus from nose and throat, frequent colds, almost constant bronchitis, deformity of chest walls, dull and listless appearance, suppurations of the middle ear, and a catarrhal inflammation of the middle ear, accompanied by a peculiar bluish red color of the membrana tympani, which I believe to be almost pathognomonic of the disease; and, in the later stages, the various deformities of the superior maxillary bone. The presence of large masses of adenoids in the vault changes to a large degree the normal physiological functions of the nose and naso-pharynx.

Instead of a respiratory organ, it becomes an obstruction to

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*Hyperplasia of the Lymphatic Tissue of the Pharynx and Naso-Pharynx, *Med. News*, Jan. 19, 1889, page 62.

†*Deutsche Medi. Boch.*, 1884, No. 20, page 313.

respiration and a general disturber of the process, and the epithelial changes in the mucous membranes of the nose and naso-pharynx finally result in a chronic catarrhal development. In aggravated cases the operation for removal brings about such a marked relief of the symptoms, especially those relating to sleep, that during the first few nights following the parents become alarmed at the extreme quietness which prevails. One mother remarked that the child was so still that she thought he must be dying or dead.

The diagnosis of enlargement of the faucial tonsils is easily made by simple inspection. In adenoid cases it is not so easy, unless one has had much experience.

There is usually some symptom which leads to an examination. It may be the facial expression, the voice, or discharging ears. Most authorities recommend that the diagnosis be made by introducing the finger into the vault, and by so doing feel the glandular mass. This procedure is very painful, makes the patient gag and strangle, and also makes the little patient one's enemy for life. I rarely find it necessary to adopt this method. Instead, by a little gentle persuasion, one can make a far better examination and diagnosis by means of the tongue-depressor and a small mirror. This procedure is not painful, makes the patient a friend instead of an enemy, and gives confidence to allow any further treatment of the throat that may be required. There are many cases which present symptoms so marked that a positive diagnosis may be made without resorting to either method of examination.

It has been proposed to make a diagnosis by means of the Valsalvan method; that is, by attempting to inflate the ear by holding the nose, failure to accomplish the act indicating the presence of adenoids. This method is only mentioned that it may be condemned, as the danger of forcing some of the ever-present infective secretion into the Eustachian tubes, where it is prone to excite severe inflammation, renders it an unsafe procedure.

Sequelæ.—Of the various diseased conditions depending upon and resulting from disease and enlargement of the glands in the naso- and oro-pharynx,—*i.e.*, the adenoids and the faucial tonsils,—a few may be mentioned. The general health is always more or less impaired, there is apt to be retardment of the general growth and physical development of the child, and anemia. This results from the lack of proper oxygenation of the blood due to the reduced quantity of air, a condition which continues both night and day. It is also due to the frequent colds, the unhealthy secretions, and the almost constant bronchitis which these patients seem to be subject to. Among the most marked results of operation are the increased weight, better color, and improvement of chest conformation.

In enlargement of the faucial tonsils we have the attacks of catarrhal, follicular, or suppurative tonsillitis, and later on a tendency to a degeneration which might be termed cheesy. These masses of cheesy-looking, foul-smelling material are found deeply imbedded in the crypts.

Chronic catarrh of the nose and throat may be looked for. In severe cases there occasionally may be found considerable deformity of the chest. The sternum becomes prominent, and the sides of the chest fall in, giving the pigeon-chested conformity. But even where no such deformity exists there is a general arrest of development.

After operation the gain in flesh is very rapid, often amounting to several pounds in a single month.

Of all the accompanying and resultant affections from adenoids and hypertrophied tonsils, that to the ear is fraught with the gravest dangers and most serious consequences. It may be either a catarrhal deafness or a suppurative process. In either case the condition is serious, threatening the child with partial or total loss of hearing, unless prevented by operative interference.

These growths are the most potent causes of attacks of middle ear suppuration, and when such attacks are frequent one may almost be sure to find the cause in the naso-pharynx.

That they are many times the cause of total and permanent deafness in children has been proven time and time again, and deaf-mutism from this cause is a deaf-mutism which might have been prevented if parents, dentists, and physicians could have been alive to its seriousness.

Frankenberger* claims that the percentage of adenoids in deaf mutes is much higher than in the general run of children, and he substantiates his claim by a report of the examination of one hundred and fifty-nine deaf mutes. Adenoids were found in ninety-four, or 59.49 per cent., whereas children in general have adenoids in the ratio of about six per cent. This remarkable frequency of adenoids in deaf mutes he considers as certainly not accidental, but that they stand in some causal relation to deaf-mutism. How little we realize how the deaf child is handicapped in the struggle for both education and later for his daily bread.

In a paper† read before the Medical Society of the State of New York at its ninety-second annual meeting I called attention to the fact that "children with defective hearing should be given every advantage in the struggle for education." There should be competent aurists upon the staff of every institution which has for its work the care of children, especially those for the deaf and dumb and the public schools.

The ears of all public school children should be tested, and such recommendations made to teachers and parents, especially if adenoid growths and hypertrophied tonsils exist, that the child may be relieved by operation and, if possible, cured.

Schæling has said, "The results upon its later mental development of a marked diminution of hearing in a child are, unless compensated for by other instruction, decided and permanent, affecting the understanding, the character, the self-confidence, and, at a later period, the ability of self-support, mental tools the possession of which is valuable and the want of which can never adequately be supplied."

When we consider the influence exerted by the ear upon human

Annals of Otology and Rhinology, Nov., 1897, page 395.

†*Albany Medical Annals*, June, 1898.

life, its intimate association with all the phases of life, being the messenger of all sounds, from the joyous prattle of innocent childhood to the stern sentence of the judge, from the inspiring music of human voices to the thunderous tones of the great organ and the finer strains of finer instruments, from the dull, discordant, rasping noises incident to great cities to the cheering songs of birds and homelier and quieter sounds associated with pastoral life, we can but be convinced that, inasmuch as the responsibility for preservation depends largely upon the members of our profession, we should make every possible preparation to meet the demand.

As to the effect of enlarged faucial tonsils and adenoid tissue in the pharyngeal vault upon the development of the superior maxillary bone and the conformation of the teeth, opinions certainly vary, and it would seem with good reason. It seems to this writer that too much stress has been laid upon these conditions as causative factors, both by dentists and nose and throat specialists.

So far as the faucial tonsil is concerned, it can have but little effect upon the condition mentioned except in the severest cases, and where the hypertrophy is very great.

It does not seem feasible to argue that merely because of the fact that the mouth of a child is more or less constantly open when suffering from adenoids, the atmospheric pressure within the mouth would push the hard palate upward, as Hooper suggested. I certainly should not consider a V-shaped arch a diagnostic sign of adenoids, while, of course, it might lead one to search for them. Dr. E. S. Talbot, of Chicago, says, "There are many cases of contracted arches where mouth-breathing does not exist; there are also many cases of normal arches where mouth-breathing is present." Eames,* of Boston, in his paper remarks that "it has been said that adenoid growths in the pharyngeal vault cause irregularities of the teeth. I do not believe this to be the case, but rather that the dental irregularities are only another expression of the same cause that operates to produce the adenoid growth. In other words, there is one cause common to both, yet this cause may not be able in all cases to produce both. The bone-developing, vital movement may be strong and active by inheritance, while the lymphatic glandular system is weak."

One of the latest contributions to the literature of this subject is that of Bryan,† in which he states that "a brief reference may be made in connection with mouth-breathing, to the changes in the arch of the hard palate, which in the very young becomes altered, assuming an acute bow or V-shape." "This deformity results from a combined pressure of the buccal muscles exerted on both sides, and a column of air constantly striking the hard palate." "Kooner distinguishes between the alterations of the upper jaw of children who have suffered from nasal stenosis before the shedding of the deciduous teeth and those which result from nasal stenosis during the change of teeth." "In the first instance there

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*The Relation of Adenoid Growths to Irregularities of the Teeth, etc., *Journal of the American Med. Assoc.*, Feb., 1896.

†American Text-Book, Dis. of the Eye, Ear, Nose, and Throat, page 852.

occurs generally the cupola-shaped elevation of the palate; the alveolar border, which naturally forms a semicircle, assumes the form of an ellipse, but there is no change in the position of the teeth." "If the nasal stenosis exists at the time of the change of the teeth then the lateral alveolar borders are approximated, while the anterior border is pushed forward, and the high arch of the palate increases until it encroaches upon the cavities above. The teeth in those cases assume a very irregular shape."

It was my purpose to have a large number of impressions taken from adenoid patients of all ages and degrees of enlargement, but I failed to get any one to make the casts. Here are a few, however, kindly prepared for me by Dr. W. W. Walker. These eight represent the adenoid patients present at my ear clinic at the Manhattan Eye and Ear Hospital one day.

They range from three to fifteen years. Some had both hypertrophied tonsils and adenoids, and some had adenoids only. The age is marked upon each cast, and the mark A indicates an adenoid case only, and A and T indicates adenoids and hypertrophied tonsils. You are better able to judge than I as to whether these few cases show any deformity. They all seem to be practically normal in outline.

I fully realize that the number is too few to be of any practical value in this discussion, but a long experience of active work both in hospital and private practice has led me to conclude that deformities of the superior maxillary bone accompanying adenoids and hypertrophied tonsils are the exception rather than the rule. In other words, one will find many cases which have adenoids and hypertrophied tonsils to a degree sufficient to require operative interference, to one which also has the jaw deformity.

Again, it is not an uncommon thing to find deformed jaws in cases which have never had adenoids or hypertrophied tonsils. I do not wish to be understood as taking the position that these conditions are never the cause of deformities of the jaw and teeth, but, inasmuch as the deformities mentioned are found both where they are present and where they are absent, it would seem fair to contend that these are far from being the sole cause. I would further suggest that in order to produce marked deformity of the jaw and teeth the adenoids or tonsils, or both, need to be so greatly enlarged as to produce almost entire mouth-breathing, and even then the condition would need to be present some years to produce such deformity.

It is certain that an important part played in this peculiar bone deformity is the general lack of osseous nutrition. This may be serious enough to come under the general term rachitis, or it may be just on the border line.

The presence of marked adenoid development may so interfere with the general health and nutrition of the body as to introduce an element of weakness into structure and growth of the bone. This state of affairs plus abnormal breathing would tend strongly to deformity.

It would seem that heredity is no mean factor in the causation of high-arched palate and crooked teeth. "Like father, like child" may be an axiom here as well as in other characteristics. One may inherit a Roman nose or a flat nose, high cheek-bones or a round facial contour. Why may he not inherit a V-shaped hard palate?

I am fully aware that some of the arguments in this paper are somewhat at variance with those usually made by writers upon this subject, but it is the honest expression of convictions which have ripened from considerable experience.

The title of this paper does not call for any discussion of the treatment, and at this late hour your patience will not be taxed by more than a few general statements, and these mostly confined to the removal of adenoids.

If the faucial tonsils are large enough to interfere with respiration or deglutition, or if they are the seat of frequent inflammatory attacks, they should be cut out. In childhood the operation is almost entirely free from danger. It is not necessary to administer an anesthetic for a tonsillotomy.

If adenoid or lymphoid tissue is present in the vault of the pharynx in either small or large quantities, it should be removed, and with the least possible delay.

An anesthetic should be administered unless there exists some good reason not to do so. The instruments recommended are legion, and I show you a few of them, good, bad, and indifferent. It is important to have an assistant to administer the ether who is not only experienced in giving ether to adenoid patients, but who can at the same time render important service to the operator. Skillfully performed, there is but little danger in the operation.

The operation can and should be done rapidly, and the first instrument introduced should be of such a nature that nearly the whole mass may be taken at one bite. For this strong, heavy forceps are the best. The Brandigee is probably the best of this type. This should be followed by the curette, and finally the finger may be introduced for the double purpose of ascertaining if all is removed and of tearing out any odds and ends remaining. All of this need not consume more than about one minute of time. It is a bloody operation and one not pleasant to perform, but the results more than compensate. One might amputate a limb with less loss of blood. By advising rapid operating I would not wish to be understood as deprecating the importance of thorough removal of the growths. Thorough removal is of the utmost importance, but the operation can be rapid and at the same time thorough.

The after-treatment is simple. Rest in bed for from twenty-four to forty-eight hours. The operation should be done at the patient's home or a private or public hospital, as the patient should remain where he is for the time above named.

Aside from these precautions, cleanliness is all that is necessary, unless some complication arises, and this is not likely to occur. Parents are gradually becoming educated to detect the symptoms of these growths, but wide-awake dentists have an unusual opportunity to detect these symptoms, and with it comes a duty to add to their already useful avocation that of aiding parents to see the importance of subjecting their afflicted children to operative interference, and free them from these conditions with their long train of attendant symptoms and serious results.

Every advancement in the science of medicine and surgery, as well as every increase in the knowledge and efficiency in the individual members of the medical and dental professions, means the saving of human life and the alleviation of human suffering.

THE CONSTRUCTION OF PARTIAL DENTURES COMBINING THE PLATE AND BRIDGE.

BY DR. A. S. CONDIT, FINDLAY, OHIO.

(Read before the Union Meeting in Baltimore, June 4, 1898.)

So much has been said and written upon the subject of constructing partial dentures that it would seem as if there was nothing left to say, but when we look back upon the past and see how it has been marked by wrecks and ruins we can but conclude that the end is not yet, and success is before and not behind us.

For the past three years I have had exceptional opportunities of visiting the dentist in his laboratory, and of seeing the good and bad, and of learning the many different ways our profession has of doing their work to accomplish the same results. The most astonishing thing is the difference of opinions. Some dentists are broad-minded enough to recognize merit in other systems besides the ones they make use of; others, I regret to say, hide behind their own especial hobby, and act as if they were afraid to venture forth, and if occasionally they do examine another system, their own especial favorite is so magnified to them that they are not able to see any good in any other method.

If it only required mechanical ability and artistic skill, the prosthetic dentist might have reached the goal many years ago. But it requires much more, chief among which comes the judgment to decide about the adaptability and durability of the work; for if these be ignored failure is certain to be the result.

Much has been said against bridge-work, but most certainly the advantages of a well-constructed and carefully adjusted bridge cannot be questioned. Many cases present themselves that offer admirable opportunities for the conscientious operator; but its indiscriminate use cannot be too strongly condemned.

It is not my purpose at this time to enter into the pros and cons of bridge-work, but simply to point out some conditions, in certain cases, that render this class of work unsuitable, and name some cases where another system can be used much more advantageously.

I might say, in passing, that the system of bridge-work, as well as other systems of decided merit, is condemned when fault of manipulation alone is the cause of failure. I suspect all of us have seen bridges that were failures because of badly fitted crowns and faulty articulation; either the gold used in making the crowns was too light, or not enough solder was used in connecting the bridge teeth. A failure from such causes should not condemn the system. But a failure is likely to occur from another source of which the workman may not be entirely to blame,—that of a miscalculation as to the amount of strain the piers can endure.

For a number of years I firmly believed that when two or more piers were used in supporting a fixed bridge, a part of them firm, and part loose, because the denture was as firm as the firm teeth, the loose teeth would be held solid, and have an opportunity of healing and resuming a normal firm condition. Experience has exposed the fallacy of this belief, for instead of the loose teeth becoming firm and bearing their share of the burden, the solid teeth had all the work to do, and they in their turn became loose, as no piece of mechanism is stronger than its weakest point. Work when there is considerable strain on the attachment teeth should never be attached to weak piers. If the force of resistance of the dental bridge could only be decided by an arithmetical demonstration or mathematical formula, how much our work would be simplified; but, as this cannot be done, the dentist must rely on judgment alone, and sometimes his desire to display skill gets the better of his judgment, and he does not use the class of work best suited to the case.

Another reason for failure in bridge-work is because only the strain of direct occlusion is taken into consideration, and no attention is paid to the lateral strain, which is far greater than when the jaws are in their normal position. When the cusps of the upper molars and bicuspids come in contact with the same in the lower jaw in the process of mastication, while sliding in place in the sulci, it is in that movement that strain is caused. If this fact regarding the comparative strain is true, how can we expect the saddle bridge, which rests only on the top of the ridge, not to bring strain on the attachment teeth when the jaws are used in lateral motion?

It is quite a common practice with some workmen, when the molars are missing, to connect two crowns, preferably the bicuspids (either the upper or lower), and attach them to a narrow saddle and permanently cement them in place.

I cannot personally speak of the results of such practice, for I have never made a case in this manner, for I felt confident that I would only be confronted by a failure.

I find in an article by Dr. Lowry, of Kansas City, that he says "but little is gained by crowning two approximating bicuspids and soldering them together for an anchorage for a lever bridge, as the one bicuspid becomes a fulcrum, and the other the point of resistance, as force upon the extreme end of the lever exerts a push upon the fulcrum crown, and the latter of which, or its supporting root, must sooner or later give way."

My opinion is, if the ridge is entirely covered, the sides as well as the top, such bearing will take the strain from the tooth or teeth anchored to, and in case the ridge is flat the plate should be extended forward or backward both on the outside and inside surface of the gums next to the teeth.

One of the leading causes of failure in removable work is the lack of practice and experience because of the great variety of conditions. We find the flat, the high, the soft, and the hard ridge. In the plate work the bearing is all upon the ridge, and in the so-called self-cleansing bridge-work it is all upon the teeth anchored to, while in the combination it is upon both, and without a consideration of the condition of the ridge trouble is liable to occur, especially in the one-attachment cases.

In my estimation, fixed work has its place, but in many cases the removable is far better. It is better because it can be kept in a thoroughly aseptic condition, better because the ridge assists in bearing a part of the strain, and better because it can be easily repaired. In considering the points mentioned as making the removable work preferable, first, the difficulty of keeping the bridge-work clean. I believe in some cases, if properly constructed, it can be thoroughly cleansed, but such cases are the exception and not the rule. Many of our best workmen condemn it on this ground alone.

The argument of some against removable work is, that the bearing cannot be made equal between the ridge and the teeth attached to, as one is a yielding substance, and the other is not. Experience has caused me to take issue with such an argument. Theoretically it may be true, but practically it is not. My theory, verified by experience, is that we will not have undue absorption without undue pressure. If there was no other reason for using removable work, that alone would be sufficient. If the removable work is made to press hard upon the ridge before the attachment comes together, there will not be much, if any, subsequent absorption.

The advantage of having work that can be repaired without marring its appearance needs no comment. Is there anything a dentist (and, I might add, our patients also) dreads more than to be obliged to split three or four nicely-made and well-adjusted crowns to make a repair?

This particular kind of work which I desire to call your attention to, combining the plate and bridge, is retained with an attachment, a part of which is placed on the crown, and a corresponding part in the plate. The crown portion is a uniform gold clasp tube open upon the side and at both ends, and because of these openings it is impossible to become clogged; by having openings on the side the tension on the tube can be controlled as the case demands.

I have used the telescope crown system, which answers the purpose of releasing the pressure from the ridge, but it was a failure, as it would soon get loose; have tried the square and triangular pin, with box of corresponding shape, but have never found anything that would work as well and occupy as little space as the round pin and tube. By having the outside tube to shield the pin, and prevent spreading of the inside tube, rotation is prevented as perfectly as with the dovetail.

Three years ago last October I inserted my first case, which has been worn with as much satisfaction as a fixed bridge ever was, and is doing as good service to-day as at first. It was a single attachment case, consisting in the extension of the lower molars attached to the second bicuspid root. Absorption of the ridge at the heel of plate and a consequent strain upon the tooth attached to was anticipated and provided for by allowing for the lowering of the tube at the opposite end, which could not have been done had the attachment been placed on top or in the root of the tooth; and besides, if it was so placed, it would be almost impossible to keep clean. I have not had to shorten the tube, as there has been no evidence of any change. Failures will occur with this work from faulty manipulation, many thinking because it looks simple it can be made carelessly, but they will be mistaken.

The proper placement of the attachment is of the greatest importance. It must not only be so placed as to be out of the way of artificial teeth, but should be perfectly perpendicular, regardless of the position the anchorage tooth or teeth may be in. In the two attachment cases it is not only necessary that the attachments be in a perpendicular position, but that they be absolutely parallel with each other, and for that purpose I have devised an implement which is called the "guide." It is to the dentist in making this work what the square is to the carpenter in truing his work. It is easily adjusted to any length of span, also to any position the teeth may have in the arch. It is not only indispensable in setting the tubes to crowns, but fully as necessary in adjusting crowns in same position on the teeth.

AMALGAM AND GUTTA-PERCHA IN COMBINATION AS A FILLING.

BY DR. L. C. F. HUGO, WASHINGTON, D. C.

(Read before the Union Meeting in Baltimore, June 4, 1898.)

WHEN an extensive approximal cavity in a bicuspid or a molar presents itself, we are sometimes puzzled as to what material to fill with. An all-metal filling may be contraindicated by probable irritation from painful transmission of sudden thermal changes, by poor structure of the tooth, or by impaired general health of the patient. Gold or amalgam might make only disastrous temporary work. Gutta-percha in compound cavities, though in itself a reliable preservative of tooth-structure, will not long withstand the wear and tear of mastication. Cement, though more resistive, will not in the majority of cases last effectively more than a year, and cannot be trusted near the gum. A composite of cement and gutta-percha, though better than either separately, is still open to objection, because of the cement's yielding too readily to the solvent effect of some constituent of the saliva.

In these cases I have found the combination of amalgam and gutta-percha to answer a very good purpose.

This composite is old; but mention of it appears in our literature merely as a suggestion. I do not remember having read anywhere a detailed description of its use and merits. However, such description may not have been thought worth while giving, since the method of making such a filling is so very simple, and because the merits of the composite are not generally admitted or recognized.

The combination of amalgam and gutta-percha makes a reliable and serviceable temporary filling in the compound approximal cavities of bicuspids and molars:

(1) Of children, the structure of whose teeth may not be good; and

(2) Of adults, where pulp-extirpation or capping and permanent filling may not be deemed advisable.

In the case of children, where the second teeth are of a structure that will not promise permanence of gold or of amalgam work, or where such work would involve a very great tax upon the endurance of the young patient, it is a question whether to attempt doubtful and trying all-metal filling, or to subject the patient to the annoyance of a purely temporary makeshift, which must frequently be renewed, and which, in the case of cement, may become dangerous at the necks of the teeth. When in doubt we certainly do nothing worse than err on the safe side if we put in a temporary filling, combining the desirable qualities of such a composite as amalgam and gutta-percha.

In the case of adults, where extensive decay has formed more or less near the pulp and reaching beyond the gum-line, the cavity difficult of access,—where, in short, all-metal work, even with the employment of pulp-capping, may endanger the comfort of the pulp, and where, as taught by general experience, re-occurrence of decay is probable,—it is with some misgiving that we insert so-called permanent work. Here, too, the composite under consideration has given me good results.

Again, in the case of senile softening of the necks of teeth (compound approximal or buccal cavities being understood), where the chances are preponderantly against the serviceability of all-metal work, the combination of amalgam and gutta-percha can be inserted with the expectation of relative permanency.

Now, a few words as to the preparation of cavity, relative proportions of the constituents, and durability of the amalgam-gutta-percha composite.

The cavity is prepared with special reference to securing strong, clean walls, and, if possible, free margins. The part of the cavity to be occupied by the amalgam-top should be so shaped as to offer a hold independent of the gutta-percha substructure. This obviously is an important consideration.

It should be borne in mind that the gutta-percha in this composite is not inclosed; it fills the whole cervical aspect of the cavity.

When frail teeth, or such as have senile softening, are to be filled after the plan here discussed, the proportion of gutta-percha should be greater. That is to say, approximately two-thirds of the filling should be made of this material; while in stronger teeth the substructure need occupy only the cervical third or fourth of the cavity.

As it is almost indispensable that the gutta-percha should have a dry surface to rest on, and as this is obtained often with difficulty when the cavity reaches beyond the gum-line, a crescent-shaped, thin, steel shield, or a thin-blade curved spatula, is of great convenience. A good feature of the shield is that it shapes the filling, thus rendering unnecessary laborious and risky trimming. It is needless to say that, in order to secure accurate adaptation in the angle formed by the shield and the cavity-walls, the filling should be started with small pieces of the gutta-percha inserted with rather pointed plugger-ends.

In shaping the filling as a whole, it is best as far as possible to follow the normal outline of the tooth; there should be a free neck and a knuckling morsal surface. The gutta-percha in place, if not already molded by the shield, is trimmed flush with the cavity-margin; then with a warmed ball plugger-end it is pressed at about the middle of its surface so as to be spread across the interdental space into contact with the adjoining tooth. This is done to offer an easily-made base upon which to build the knuckling amalgam-top.

As said before, the amalgam-gutta-percha composite is intended only for a temporary purpose; yet in length of service it frequently outlasts similarly placed permanent fillings. A few years after entering practice I began treating cavities that required temporary work in the manner here described, but unfortunately I did not realize the necessity of regarding the amalgam-top as an independent filling; that is to say, sometimes I had failed to shape the cavity for the superstructure so as to secure this part against the force of mastication. As a result, I abandoned the composite, having wrongly ascribed some failures to swelling of the gutta-percha. When, however, a few years later I found that this kind of filling did excellent service where the cavity had been properly shaped, I again resorted to it, particularly in critical cases.

To show that this work will sometimes outlast merely its temporary purpose, I will cite the case of a brother dentist for whom, in 1886, I filled with amalgam-gutta-percha a compound approximal cavity in a molar. The doctor believes in the functional activity of his teeth, giving them hygienic exercise with crusts, Bent's crackers, and other hard food. Though intended to be only temporary, the filling has done full duty all these years. Not long ago I examined another case, which, to all intents and purposes, was as good as a permanent filling, it having reached the respectable age of fourteen years, with a promise of lasting possibly that much longer.

It is true, the gutta-percha may deteriorate, but the danger is not very great if a good make is used, and if in the insertion and trimming it is not unduly softened.

In conclusion, I wish to say that amalgam-gutta-percha work combines to a great extent the desirable qualities of a temporary and a permanent filling. It lasts from two to ten years or more, securing comparative thermal insulation of the pulp, preservation of the cervical margin, and an indestructible grinding-surface. When a cavity thus filled is ready for the all-metal work, it will be found none the worse for the treatment with this composite. Considering the length and quality of service, this much cannot always be said in favor of other kinds of temporary fillings.

DISINFECTION OF INSTRUMENTS.

BY H. O. REIK, M.D.,

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(Read before the Union Meeting in Baltimore, June 4, 1898.)

MR. PRESIDENT AND GENTLEMEN: Perhaps I should offer some excuse to this society for presenting a paper upon a subject that may seem to many of you to have become hackneyed. Every surgery of the present day devotes more or less space to a consideration of this topic, and since the early days of Lister the teachers of medicine have industriously promulgated the theory of disinfection, while in the clinical work of the schools it has been practically applied, with more or less earnestness, according to the whims of the individual instructor. There should not then at this time be any necessity for a talk upon this subject, yet I am convinced that there are hundreds of men, both in dentistry and in the general practice of medicine, who, in their private practice, where their work is not closely scrutinized by professional brethren, either make no effort whatever to practice disinfection, or practice it in such a loose and careless manner that it is worse than useless, because in the course of time it deceives even themselves into believing that they are doing the correct thing.

I shall therefore in the short time at my disposal consider this question from the practical standpoint, first briefly reviewing the necessity for disinfection, and, secondly, the means by which disinfection can be most certainly secured.

It is now a little more than two hundred years since Anthony van Leeuwenhoek announced that he had succeeded in making a lens with which he could distinguish minute, living, motile "animalcules" in a drop of rain-water. Actuated most likely by curiosity, he began to examine with this lens, not only rain and sea water, but the secretions and excretions of various animals and birds, making notes of the fact that the animalcules seen in these examinations differentiated themselves one from another by their size, shape, and peculiarity of movement. It may interest you to know that one of the most important pieces of work he performed, and upon which he laid great stress, was the discovery of a particular form of micro-organism in the tartar scraped from between the teeth. He made an elaborate report of this investigation to the Royal Society of London in 1683, and there is no doubt that he then saw what we now recognize as bacteria. From that time on a number of workers engaged in the attempt to prove a causal relation between the micro-organisms discovered and described by Leeuwenhoek and the infectious diseases.

Plenciz, a physician of Vienna, in 1762 was the first to put forth this doctrine, for Leeuwenhoek had not attempted to speculate upon his findings, but he met with strong opposition and his theories were supported or opposed by various able men for over one hundred years, and it remained for Pasteur, Koch, and their co-workers to establish a scientific basis for our present bacteriological knowledge.

As a result of these studies, we are able to say to-day that certain disease conditions, certain pathological changes in the tissues, are always due to the presence of a certain specific micro-organism; that that organism is capable of reproducing itself with remarkable rapidity; that it may be cultivated indefinitely; that the cultivated organism inoculated upon a susceptible animal will give rise to the same pathologic changes from which the organism can be reclaimed, and so on *ad infinitum*. That some of these organisms are constantly present in the air about us, and that the source of our food and water supply cannot be too closely and constantly guarded from contamination, I need hardly tell you, and I only call attention to it because it leads up to and explains the presence of these microbes that we shall endeavor to destroy. It accounts probably for the fact that the mouth of nearly every individual contains some one or the other of these well-known organisms; for instance, if a bacteriological examination be made of the saliva from the mouths of healthy individuals a very large percentage will show the presence of the tubercle bacilli, as many more will show the micro-organism that produces pneumonia, and quite a large number will show the diphtheria bacillus, while some persons will exhibit the presence of more than one variety of micro-organism. These people remain healthy, notwithstanding the presence of the organisms of disease, because their natural powers of resistance to these bacteria are sufficient to overcome their attacks; but what would be the effect if by some chance that individual's power of resistance should be temporarily weakened, or if perchance these bacteria should enter the mouth of some individual who has naturally but slight resistant power? The answer is clear to you: the bacteria would gain the upper hand and produce the disease they represent.

Now this is especially applicable to dentistry, for you as oral surgeons are always dealing with cavities that may be, and probably are, the homes of some pathogenic bacteria, and though the person being treated and who harbors these dangerous organisms is not sick, you may produce disease in your next patient should you by accident transfer some of this poison from the first to the second patient, and should that latter be in a condition of susceptibility. That is not a theoretical proposition, but unfortunately there are numerous instances recorded, not a few right here in Baltimore, where diseases have been communicated from one person to another through the medium of the dental instruments. It is essential, therefore, that we should be most careful to guard against carrying disease from one individual to another, for our duties as physicians require that we should not only stamp out disease where we see it, but do everything in our power to prevent its appearing in a new place. We should be sure that every instrument we use is absolutely clean,—not merely clean in the sense that no particles of dirt are apparent to the eye, but clean in the sense that no living microscopic objects are upon it.

Now, how can we best accomplish this? In the first place, it is necessary that the operator keep his hands clean. For your work this is sufficiently accomplished by ordinary washing with soap and water, unless you should have been handling some known infected object, whether it be tooth or instrument, and then you may, in addition to the ordinary cleansing, dip the hands in a solution of bichlorid of mercury or carbolic acid.

The second point is the disinfection of instruments, and for this there are several methods. All instruments should be mechanically cleansed by washing and wiping with a dry, clean cloth after each operation, and should then be disinfected before using again.

Perhaps one of the easiest ways of securing disinfection is to lay the instruments in a 1 to 20 solution of carbolic acid for fifteen minutes; this is probably effective, but there may be instances in which it would not be reliable. Other chemical solutions have been used, some with good effect, but there are numerous objections to them in that they are either not reliable for destruction of the bacteria, or that they tend to destroy the instruments.

Heat has been considered until recently the most thoroughly satisfactory agent for the destruction of bacteria, and it is not likely soon to be entirely displaced by any other agent; but even heat has some objections. In hospitals, or large institutions, we can use the steam sterilizer, or even an apparatus for applying dry heat, but in the daily office work the best we can do is to submit the instruments to boiling water. Most of the small steam sterilizers that have been devised for office work are so troublesome or require so much time that the average busy practitioner finds them impracticable. To boil one's instruments as frequently as the dentist would be required to do in the course of the day means the loss of a very considerable amount of time. The objections to heat are that it destroys in a very short time the cutting-edge of a knife or scissors, and that it tends to loosen and ruin the handles of instruments unless they be of one solid piece. A small bit of bicarbonate of soda in the water overcomes the tendency to corrode the metal, which happens if the instruments be boiled in plain water.

Another method which I would like to speak of is the use of formaldehyd gas. I reported to the Johns Hopkins Hospital Medical Society some time ago a series of experiments which Dr. Watson and I conducted with that gas. Our articles appear in the *Johns Hopkins Hospital Bulletin* for December, 1897, and in the April number, 1898. I have since exhibited at a meeting of the Maryland State Dental Association an apparatus which I devised for the sterilization of instruments, and which I think is more serviceable to the dentist, the ophthalmologist, laryngologist, etc., than any other sterilizer now in use.

This formaldehyd sterilizer consists simply of a small air-tight chamber, in which, by means of an alcohol lamp, the formaldehyd is liberated from the paraform pastilles. We were able to prove that an instrument infected with the most virulent organism, if exposed for ten minutes to the action of formaldehyd in an air-tight chamber, would be rendered perfectly sterile, and we found that five grains of paraform evaporated in a chamber of one cubic foot space formed more than sufficient gas to accomplish complete sterilization. If it be desired to sterilize instruments, bandages, etc., wrapped in towels or in a cotton bag for transportation to a distant field of operation, a somewhat larger quantity of gas and longer exposure, say thirty grains of paraform for twenty minutes, is necessary.

The advantages of this method are, as I have explained before, the ease with which it can be used, the fact that it requires absolutely no attention, for disinfection is accomplished while you are fixing the next patient in the chair, and consequently uses practically none of your time, and the expense is, aside from the first cost of the apparatus, practically nothing, being less than one cent for each sterilization. Furthermore, even your most delicate instruments are not affected in any deleterious manner by the action of the gas. Such thorough, cheap, and practical sterilization, absolutely without danger of injury to instruments, cannot be accomplished by any other method with which I am familiar.

THE LAWS WHICH GOVERN THE MOVING OF THE TEETH IN THE ALVEOLI.

BY DR. HARRY E. KELSEY, BALTIMORE, MD.

(Read before the Union Meeting in Baltimore, June 4, 1898.)

In this paper it will be my endeavor to point out what I believe to be the general rules governing the movement of the teeth in the alveoli, together with a consideration of the imperfect and often injurious results obtained by the use of appliances which are defective in either principle or construction, or both; and a brief description of principles and appliances which, if properly manipulated, are sure of producing beneficial results.

As regards the movement of the teeth, then, it may be stated upon the authority of several eminent specialists in orthodontia that teeth change their position in the alveolus in two ways: first by bending or fracturing the alveolar walls by the application of great force to the teeth, and secondly by producing absorption of the alveolus in the direction in which the tooth is to move by the application of moderate force.

The first of these methods is not only extremely painful, but too dangerous to the life of the pulp to admit of consideration as a practical means of reducing an irregularity; although it is resorted to by some European dentists through the medium of the forceps, their operation consisting in taking the crown of the tooth in the forceps and applying sufficient force to it, in the direction in which it is desired the tooth shall move, to break away the obstructing alveolar tissue. This method is only mentioned here the better to illustrate the movement of the teeth upon the principle of alveolar absorption. In the first instance the tooth is moved through the alveolus exactly as a nail is driven through a piece of wood, but in the second method, while the application of moderate force will produce slow but sure movement of the tooth, the same force applied to a nail imbedded in a piece of wood will never have the effect of changing its position.

This indicates that a physiological principle is involved, and histological research teaches us that it is the absorption of tissue, due to the application of pressure. This being true, and excluding all other conditions, the movement of a tooth by artificial means would be in no sense opposed to the laws governing animate cellular tissue, provided the operation were not hastened to an unnatural degree, were it not for another physiological principle which affects such an operation.

It is well known that any healthy organ as a whole resists being in any way incapacitated for the performance of its function. I am therefore led to believe that although a tooth be out of the regular alignment, if it has been serving the purpose for which it was developed, even in an imperfect degree, it will yet offer an organic resistance to pressure; and it is this organic tendency of the teeth to retain the position which has become natural which causes them to return to their original position after being regulated, if not held in place by a retaining appliance. That this organic or functional resistance is much less manifest in some of the teeth than in others does not lessen, but tends rather to aggravate the difficulty of regulating, and this is increased by a certain natural tendency on the part of the molars and bicuspids to move forward into spaces left by teeth lost anterior to them.

No rule can be formulated giving the exact extent of anchorage required to move one or more teeth, as the relative resistance of the teeth varies greatly in different cases; but it may be said that in the average mouth two teeth will be found sufficient to move one, the cuspid, however, being an exception to this. It is not safe to attempt to move it posteriorly with an anchorage of less than three teeth, and it is even asserted by some authorities that sufficient anchorage cannot be obtained in the mouth to draw it back, and that resort must be had to the skull-cap. Certain it is that it manifests to but a slight degree the tendency exhibited by the other teeth to move forward to fill the space of lost teeth, and seems to have no tendency whatever to fill a space posterior to it.

It forms on either side of the mouth the base of an arch which will hold its position after all the teeth posterior to it have been lost (a case not infrequently met with); and will sometimes be found standing entirely alone, resisting the pressure of the lips and cheeks and preserving the contour of the face. From an esthetic point of view, therefore, its loss is more to be regretted than that of any other tooth, for no matter how skillfully an artificial denture be constructed it will not fully restore the natural contour given the face by the cuspid, its long root extending to a point never reached by the gum of a plate.

The difficulty of moving it is, without doubt, partially due to its having the longest and largest root of any of the teeth, but principally to its capacity for great functional resistance, which far exceeds in extent that of any of the other teeth. The causes which have so highly developed the function of this tooth are familiar to any one who has made even a slight study of comparative anatomy.

Now regarding the imperfect and injurious results which so often attend efforts at regulating. Where the general conditions have been favorable, and the operator and patient have both been sufficiently persevering, it is safe to say that almost all failures are traceable to one of two causes, or sometimes perhaps to both. The first of these is insufficient anchorage, and it is deplorable that so many operators discover only when it is too late the error they have made. Of all cases of irregularities there are none which, from an esthetic standpoint, so imperatively demand correction as those in which the front teeth, either upper or lower, protrude to an unnatural degree, and certainly there are none which so often result in failure when attempts at reducing them are made. As a rule most dentists, in these cases, extract a bicuspid on either side, and with the remaining bicuspids and molars as an anchorage attempt to draw the six anterior teeth back. In many cases this is successfully accomplished, but it too frequently happens that instead of the front teeth being drawn back to a natural position the anchorage is drawn forward, and this, too, so imperceptibly that the operator himself often does not notice it until the damage is done, or at least partially so. Thus the patient has derived no improvement in his facial appearance, and has sustained not only the entire loss of two teeth, but probably the good occlusion of the remaining ones which composed the anchorage.

I will not cite other cases, as this one is sufficient to illustrate the theory which I wish to advance with regard to the construction of appliances.

Now there are undoubtedly here and there individual cases belonging to the above class, which, owing to certain modifying influences, cannot be successfully corrected without the aid of the skull-cap. But in general, after the second molar is fully developed, such cases of irregularities can be reduced from the anchorage obtainable in the mouth if the appliance be constructed and inserted so as to utilize the full amount of resistance offered by the posterior teeth. To do this the appliance must be so constructed that it can be so securely cemented or otherwise fastened to the teeth which are to form the anchorage as to absolutely prevent their changing their relative positions to each other.

Then if there be any movement of the anchorage it must be as a whole, for there can be no sliding of the approximal surfaces of the teeth against each other which would permit them to tilt in the direction from which the force is applied. Therefore, when the teeth of the anchorage are firmly fastened together the full resistance of the tooth from the margin of the alveolus to the very end of the root is available. This is undoubtedly best accomplished by cementing to the anchor teeth a series of connected metal bands or collars, the resistance of which may be still further increased by connecting from side to side by means of a heavy wire.

The second general cause for failures is the adoption of a medium of pressure or action upon the teeth which is incapable of exerting sufficient force or is incompatible with the laws governing the absorption of tissue. As before stated, the movement of teeth in regulating depends upon the application of sufficient pressure to overcome the organic resistance which they exert (and this is often astonishingly great), and at the same time produce absorption of the alveolus before the advancing tooth. To accomplish this, then, we must have an appliance which is, in the first place, capable of exerting considerable power, and in the second place one which will be entirely under the control of the operator, so that the pressure applied may be intermittent, thus allowing of daily readjustment of the tissues by absorption to their new conditions.

In all the range of mechanics there has been found nothing which combines so much power together with an economy of space as the screw. It would seem, therefore, to be best adapted, from the point of power, and it is surely most completely under the operator's control, since he can hasten or entirely stop the movement of the tooth upon which it bears at will. As absorption is a physiological process, it follows that the movement of a tooth depending upon it will be painless if not hastened to an unnatural degree, thus inducing a pathological condition of the parts.

From the foregoing remarks the following may be deduced: By the use of appliances depending for action upon the screw we obtain a calculable, controllable, intermittent, and painless movement of the teeth, while those appliances depending upon springs and elastic rubber are non-calculable, non-controllable, continuous, and painful in their action.

Finally, it cannot be said that only screw appliances should be used, for many minor cases are perhaps more conveniently corrected with springs or rubber, and with no very great amount of pain and discomfort to the patient. But for extensive cases screw appliances, with anchorages well cemented to the teeth, will be found to be productive of the best results.

AN EXAMPLE IN TEETH REGULATION.

BY MYLAND A. KNAPP, D.D.S., MINNEAPOLIS, MINN.

WITH reference to the illustrations it is to be said that the descriptive matter will be clarified by a citation of the numerical designations of the devices employed, and a list of these will be found in my published work on the subject of teeth regulation.

No. 35, Fig. 1, is a threaded arch bar on which are six clutch nuts, No. 22. The No. 8 is a molar double-socket clutch band; the Nos. 13 are single-socket clutch bands, while No. 45 is a double-socket screw clutch band.

In Fig. 2 is shown No. 8 fitted, wired, and cemented upon an upper right first molar. No. 13 is likewise fixed upon the upper right cuspid, and there is also secured on the upper left cuspid another button band, No. 13. Upon the upper left first molar a screw clutch band, No. 45, is cemented and screw clamped.

FIG. 1.

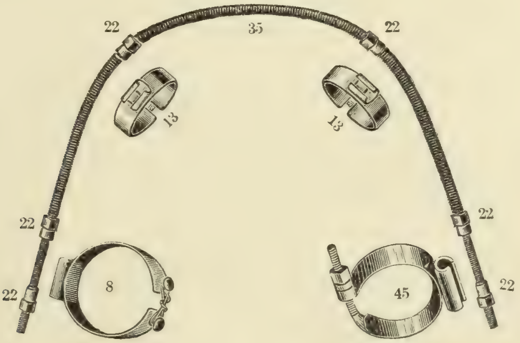


FIG. 2.

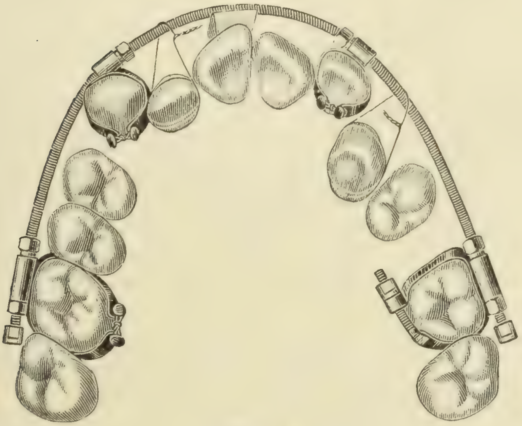
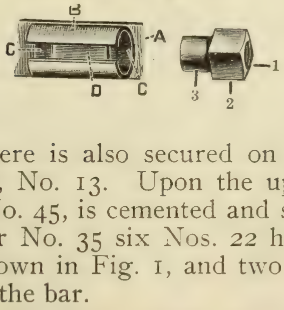


FIG. 3.



Upon the arch bar No. 35 six Nos. 22 have first been screwed into the positions shown in Fig. 1, and two bar end caps, No. 34, fixed on the ends of the bar.

This is then ready to be bent, placed, and adjusted in the position shown in Fig. 2. The open sockets of the bands are specially designed to make easy the passing of the bar through the slots into the sockets, wherein it is then screwed by means of the peculiar-shaped nuts No. 22. A magnified cut of the nut and the socket is seen in Fig. 3. It will be observed that the rounded or annular portion 3 of the nut 2 will telescope and frictionally fit in the corresponding socket or sheath C of the slotted tube B, which is soldered to the band A. The primary function of this construction is to provide for the lateral entrance of a screw bar through the slot D into the tube or sleeve B, in the telescoping or clutching socket C of which the nut 22 is screwed to frictionally hold and lock the screw bar, because the telescoping portion 3 of the nut is thicker than the slot D. Consequently in placing or removing the bar the nut or nuts remain on the bar; obviating the hitherto very troublesome necessity of pushing the bar into the tube and screwing the nut onto the bar-end located beyond the tube, which is fixed upon the tooth within the mouth.

In the present instance, illustrated in Fig. 2, the arch bar is shown to have been readily placed in the socketed tubes of the molar and cuspid bands, and operatively secured therein by turning the nuts with the wrench No. 29. Manifestly the turning of the distal nuts of the anchor teeth bands will drag the cuspids both inward and rearward, and the turning of the mesial nuts will also force the cuspids backward. Simultaneous pressure on the rubber or wood block will press the right central inward with a rotative action.

Independent traction of the right lateral and left first bicuspid may be effected by means of the wire ligatures, the twisted ends of which may with pliers be given operatively torsional strain. The engagement of the wires with the screw threads affords means for giving any desired lateral direction to the drag. Locating the twisting stress on an outside contact with the bar will be more effective than the inside positions chosen for clearness of illustration.

The grouping of these several modes of arch bar regulation in this Fig. 2 briefly presents for selection any one, or all, of them to meet the requirements of a similar case in hand.

THREE NEW REGULATING DEVICES.

BY WILLIAM H. MITCHELL, D.D.S., BAYONNE, N. J.

The positive action of the screw in regulating teeth has become so universal that any device that will render these powerful little instruments more useful and adapt them to a more extended use will be appreciated. Therefore I present some of the later ones I have in use as a supplement to those that have previously been illustrated in the Dental Cosmos; not that I claim anything new in them, but the combination of those in use will add to their adaptability and produce results heretofore unattained by this method.

In Fig. 1 the "pull-back" screw and push screws are combined in one stationary nut-post vulcanized in the plate, and are so close that they both operate on the same tooth. This is very positive in rotating centrals and laterals; for with it you work both ways on the tooth at once, or you are able to hold one side in exactly the same position and use either side as may be desired. The illustration shows it so well that further description is unnecessary. Change screws to reverse the motions.

FIG. 1.

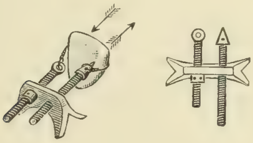


FIG. 2.

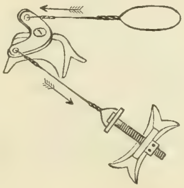


Fig. 2 is an angle arrangement suggested by what bell-hangers call a "crank," and serves to change the line of the direction of the power applied, and yet the pull on the tooth will be in the line that the operator desires. This is also vulcanized into the plate, and is used in connection with a Littig-Lee-Bennett "pull-back," found in the depots.

Owing to the peculiar position of the teeth in some cases, it is impossible to place the "pull-back" where it would do its work. Here the angle-post can be placed, and the "pull-back" wired to it can be placed in a favorable position to exert its full power, yet be out of the way.

FIG. 3.

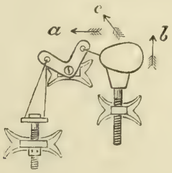


FIG. 4.

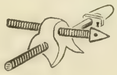


Fig. 3 shows the angle used with a push and a pull in plate; *a* shows the angle with the pull-back drawing the tooth to the left; *b* the jack pushing outward, and *c* shows the resultant direction of the movement of the tooth.

Fig. 4 shows the nut-post with threads cut so that the screws can be used at right angles. Frequently useful to move two teeth at once. With this nut both screws can push. Two pull-backs can be used, or they can be used in combination.

CORRESPONDENCE.

BACILLUS GANGRAENAE PULPAE (ARKÖVY).

TO THE EDITOR OF THE DENTAL COSMOS:

Sir,—Dr. J. L. Williams, in his "Contribution to the Bacteriology of the Human Mouth," published in the April issue of the DENTAL COSMOS, gives expression to his astonishment that, outside the members of the Odontological Society of London, he failed to find any one who had read or heard of Dr. Vicentini's work and its English translation.

To me it appears even more astonishing that since the appearance of Professor Arkövy's highly important and interesting articles in *Vierteljahrsschrift für Zahnheilkunde,* April and July, 1898, "Untersuchungen über die Pathologie und Therapie des Abscessus Alveolaris Chronicus," no review, not even a short notice of their contents, has appeared in the DENTAL COSMOS.

Now that the readers of this journal have been fired with new interest in bacteriological studies, thanks to Dr. Williams's stirring pen, perhaps they will welcome a short *résumé* of Professor Arkövy's latest contribution, and perhaps, after all, more attention will be paid to the results at the present juncture than would have been shown twelve months ago. Incomplete this *résumé* must naturally be; only a translation *in extenso* can do justice to Arkövy's long and painstaking experiments. Those readers who are familiar with the German language I must refer to the original articles, which, however, are the forerunners only of a future larger work on the same subject. I write now for those who are unable to read German. Should I sin linguistically, my excuse must be that English and German are both foreign languages to me.

I imagine that I can best picture what Arkövy had in mind when he commenced these investigations in 1893 by giving three quotations from Miller's "Micro-Organisms of the Human Mouth:" "Infections through gangrenous tooth-pulps are to be ranked among the most frequent pyogenic infections of the human body." (p. 285.) "The subject of the bacteria of the diseased pulp is one which has as yet but little occupied the attention of bacteriologists, consequently little definite is known about them." (p. 98.) "Pure cultures from gangrenous, as well as from suppurating pulps, revealed, besides the pyogenic staphylococci, other microbes of considerable pathological action. . . . It is highly desirable that this subject be investigated as thoroughly as its importance demands." (p. 295.)

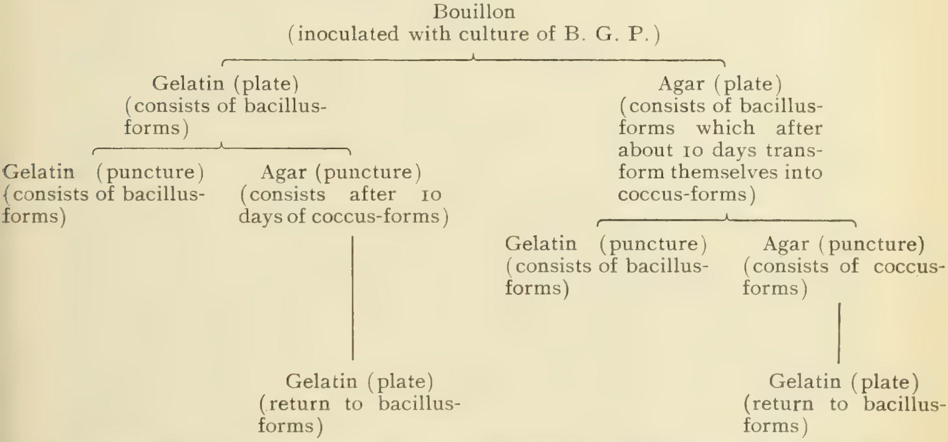
After the first twelve months' labor Arkövy found that a pure culture of a bacillus which he had separated could, in consequence of its constancy and other characteristics, be proclaimed *the specific agent in the production of pulp-gangrene.* He further claims to have found this bacillus to be the most prominent, if not the only, factor in wound-gangrene (leg, arm, etc.). To this micro-organism he has given the name *Bacillus Gangrœnæ Pulpæ.*

Materials of experimentation: Temporary and permanent root-canal fillings. Different gangrenous pulps. Tooth-bone (dentin and cementum). Saliva. Detritus of wound-gangrene.

The following is a description of Bacillus Gangrænæ Pulpæ:

Habitat.—Mouth, teeth, saliva, gangrenous wounds.

Morphology.—The bacillus is a pleomorphic bacterium. The proof of its pleomorphism is illustrated thus:


Bouillon
(inoculated with culture of B. G. P.)
Gelatin (plate)
(consists of bacillus-forms)
Agar (plate)
(consists of bacillus-forms which after about 10 days transform themselves into coccus-forms)
Gelatin (puncture)
(consists of bacillus-forms)
Agar (puncture)
(consists after 10 days of coccus-forms)
Gelatin (puncture)
(consists of bacillus-forms)
Agar (puncture)
(consists of coccus-forms)
Gelatin (plate)
(return to bacillus-forms)
Gelatin (plate)
(return to bacillus-forms)

The bacillus forms on gelatin rods four inches long with sharply defined terminations; the rods appear either singly or in chains, or form characteristic obtuse angles. Unarticulated thread-forms appear often. The bacillus shows fish-like forward locomotion. In the middle of the rods are to be seen remarkably glistening oval bodies,—the spores.

Staining.—Methylen-blue colors the coccus-forms deeply. The bacillus is easily stained à la Gram, but does not then tolerate strong decoloration or double-coloring.

Growth, Biology.—After twenty-four hours the gelatin plate presents small white colonies not unlike flour-dust; they prove, under low power, to be fine-grained, golden-yellow, roundish, and furnished with outrunning threads. After about thirty hours the gelatin liquefies and becomes covered with a white, wrinkled film. A putrid, cheese-like odor is perceptible. In gelatin-puncture (vaccination) arises after twenty-four hours a small funnel of liquefied gelatin; the liquefaction soon spreads to the circumference. After ten to fourteen days the culture shows dirty brown, the gelatin reddish brown. The reaction is strongly alkaline. On serum there develops along the track a brown fluidic line; complete liquefaction of serum. In bouillon and on potatoes, coloring as on gelatin. The bacillus thrives better on tooth-pulp than on any other medium; the specific gangrenous odor is here present. The bacillus is apparently facultatively anaërobic. Temperature-optimum 37.5° to 39.5° C.

Pathogenic Properties.—Subcutaneous inoculation of mice, rabbits, and guinea-pigs. Death mostly follows. Failure to produce an artificial pure culture from these animals. No local gangrene observed. Perhaps the skins of these animals are refractory. (Clinical experiments *vide infra.*)

Dry distillation and waterbath show the temperature-pessimum to be between 115° and 120° C.,—a considerable vital resistance.

Staining of Spores.—A blood-serum culture is the best for propagation of spores, as the bacillus here thrives excellently, and three-quarter inch long bacilli are developed. The spores do not absorb coloring matter by usual staining methods; even by five per cent. chromic acid maceration and forty minutes' boiling in carbol-fuchsin the faintest pink only is traceable. The spore form is stationary; but it happens sometimes that the terminal end of the bacillus body changes to a club-shaped form.

Of much interest is Arkövy's experiment for testing the possibility of producing artificial caries in healthy extracted teeth. Three teeth were placed (July 26, 1894) in agar-culture of B. G. P. On November 21, 1895, the following astonishing results were observed: The cementum soft and carious, brown color; dentin somewhat less softened. Examined fragments found swarming with the bacilli. The tubules found enlarged and B. G. P. present. The agar-culture of strong alkaline reaction. "Who would have thought," exclaims Arkövy, "that caries of the teeth is also possible without the presence of acid!" No mention is, of course, made of the enamel, for the simple reason that the bacillus is not an acid-producing bacterium,—at least not when grown in the nutrient media used by Arkövy.

The *effect of antiseptics* on B. G. P. The bacillus form transforms itself into the coccus form. In one per cent. carbolic acid hanging-drops, on the tenth day, masses of cocci, a few of which are yet in motion, are to be observed. 1 : 400 saccharin, tenth day cocci in slow motion, nineteenth day no movement. 1 : 400 tincture of cinnamon, tenth day slowly moving cocci, threads. 1 : 1000 sublimate, after fifteen minutes no movement. Two per cent. chlorid of zinc, tenth day moving cocci. In chloroform hanging-drops the bacilli look as if they would shrink; at —1° C. no reaction. One per cent. carbolic acid bouillon; gelatin plates poured on fifth day; three days after many colonies, on fifth day gelatin liquefied. With five per cent. ditto bouillon, on fifth day two colonies. 1 0-00 sublimate bouillon, plate remains sterile. With zinc chlorid same results as with carbolic acid. The gelatin, when lightly acidulated with hydrochloric acid and then inoculated, remains sterile. When made alkaline with bicarbonate of soda remains sterile. To discover the action of antiseptics agar-plates were prepared à la Miller, and then touched with asbestos dipped in the antiseptic. The following is the result:

1. Acid. carbolic. liq. After forty-eight hours, zone clean, sharp, 18 mm.
2. Zinc. chlorid. five per cent. After forty-eight hours, zone cloudy, opaque, 13 mm.
3. Æther sulfuric. After forty-eight hours, no effect.
4. Ac. hydrochlor. conc. After forty-eight hours, zone clean, 13 mm.
5. Alcohol. After forty-eight hours, no effect.
6. Argenti nitras. ten per cent. After forty-eight hours, zone clean, 13 mm.
7. Sublimate two per cent. After forty-eight hours, zone sharp, 35 mm.
8. Tinct. Iodi. After forty-eight hours, zone sharp, clear, 45 mm.
9. Chloroform. After forty-eight hours, no effect.
10. Ol. Eucalypti. After forty-eight hours, zone not sharp, 17 mm.
11. Ol. Terebinthi. After forty-eight hours, zone cloudy, 12 mm.
12. Ammoniæ liq. fort. After twenty-four hours, no effect.
13. Ol. Caryophylli. After twenty-four hours, zone irregular, 15 mm.
14. Ac. acet. conc. After twenty-four hours, zone clean, 25 mm.
15. Ol. Cinnamomi. After twenty-four hours, zone covered with colonies, 35 mm.
16. Potassii acet. dil. After twenty-four hours, little or no effect.
17. Sodæ hydras liq. After twenty-four hours, zone clean, edges opaque, 36 mm.
18. Ol. Cassiæ. After twenty-four hours, zone opaque, covered with some colonies, 20 mm.
19. Ac. nitricum. After twenty-four hours, no effect (?).

20. Ac. sulfuric. dil. After twenty-four hours, zone cloudy, 10 mm.
21. Potassæ hydras liq. After twenty-four hours, zone clean, sharp, 11 mm.

Material was then taken from the following zones and inoculated in bouillon:

1. After twenty-four hours, bouillon very cloudy.
4. After seventy-two hours, bouillon cloudy.
7. After twenty-four hours, bouillon cloudy.
8. After seventy-two hours, bouillon somewhat cloudy.
15. After seventy-two hours, bouillon very cloudy.
17. After seventy-two hours, bouillon very cloudy.
21. After twenty-four hours, bouillon cloudy.

Of the greatest interest are the clinical and bacteriological experiments with root-canal fillings, saliva, and the inoculated healthy pulps of ten patients. The preliminary statistics which Arkövy so far has published are too extensive for reproduction here, but the following are some of the most important results established:

1. Relative frequency of B. G. P. and other micro-organisms which were found in chronic fistulated alveolar abscess, "blind" abscess, periostitis, pulp-gangrene, old root-fillings, etc.:

Of 43 cases, present in	Micro-organism.	Per cent.
41.	Bacillus gangrænæ pulpæ	95.34
8.	Staphylococcus pyogenes albus	18.60
15.	Staphylococcus pyogenes aureus	34.88
2.	Staphylococcus pyogenes citreus	4.65
10.	Streptococcus pyogenes	23.25
4.	Bacillus pyocyaneus "a"	9.30
2.	" proteus vulgaris Hauser	4.65
1.	Leptothrix placoides alba	2.32
1.	Staphylococcus cereus albus	2.32
1.	Sarcina aurantiaca	2.32
6.	" lutea	13.95
2.	White yeast-fungus	4.65
1.	Rose " "	2.32
1.	Bacterium mycoides roseum	2.32
3.	Micrococcus lactericeus	6.97
1.	Bacillus dentalis viridens	2.32

2. The pathogenic bacterium B. G. P. is to be found in the saliva of healthy, caries-free mouths, as the following cases show:

Girl, æt. 13 years. Teeth caries-free, perfect. B. G. P. present, many colonies.
Girl, æt. 8 years. Teeth caries-free, perfect. B. G. P. present, 1-2 colonies.
(?), æt. 18 years. Teeth caries-free, perfect. B. G. P. not present.
Boy, æt. 4 years. Teeth caries-free, perfect. B. G. P. present, one colony.
Boy, æt. 3 years. Teeth caries-free. B. G. P. present, one colony.
Boy, æt. 22 months. Teeth caries-free. B. G. P. not present.
Boy, æt. 2 years. Teeth caries-free. B. G. P. present, one colony.
Boy, æt. 2¾ years. Teeth caries-free. B. G. P. present, few colonies.
? ? one tooth carious, one filled. B. G. P. present, many colonies.

3. (a) Inoculation of a pure culture of B. G. P. in a living healthy pulp is able by itself to produce gangrene. (b) Inoculation of the bacillus-form produced gangrænæ pulpæ totalis, while (c) inoculation with mixed bacillus- and coccus-forms produced pulpitis chronica gangrænosa; and (d) inoculation with a mixed culture of B. G. P. + Bacillus pyocyaneus "a" produced same

result. (e) Inoculation with pure culture of Bacillus pyocyaneus "a" produced no gangrene, but was only able to arouse a purulent pulpitis. (f) In no case did suppuration set in when only a pure culture of B. G. P. was inoculated.

4. The B. G. P. is, if not the only, at least the prime factor in the production of pigmentation of carious teeth.

In regard to the question whether or not the B. G. P. is identical with any previously discovered pathogenic bacterium, Arkövy is of the opinion that in virtue of its constancy in the mouth and in carious dentin, as well as of its ability to produce artificial caries and its presence in wound-gangrene, the B. G. P. must be classed as an independent pathogenic bacterium. Its similarity or identity with Miller's Bacillus pulpæ pyogenes and Bacillus fuscans, and with Sternberg's Bacillus septicus ulceris gangrænosi and Galippe and Vignal's No. 5 caries-pilz, cannot well be established owing to the meager experimental data available in connection with these micro-organisms. Jung's O caries-pilz has, of all, the strongest resemblance with B. G. P., but here also more experimental facts are required before an identity can be established.

The experiment to produce a toxin from a pure culture of B. G. P. had, owing to circumstances, to be postponed. Arkövy thinks that the possibility is, from a clinical standpoint, not excluded, as many phlegmonous processes connected with high fever, and even prostration, often follow in the van of pulp-gangrene.

Some additional clinical and bacteriological experiments, based upon Professor Arkövy's investigations, were finally undertaken by Dr. Dobrzyniecki at the University of Budapest, with the view of finding which particular micro-organisms, if any, would remain present and active in deep caries after removal of decay and sterilization of the remaining layer of macroscopically sound-looking dentin (the general prophylactic treatment among dentists). The micro-organisms which should be found would then most likely be those which play a direct part in the progression of dentinal decay. The bacteriological result of eight cases examined was that in no case did the bottom of the cavities remain sterile. In those cases where no sterilization took place prior to filling the pyogenic organisms were, next to the B. G. P., the most prevalent. When, on the contrary, sterilization took place (one per cent. bichlorid of mercury and concentrated carbolic acid), and the apparently healthy dentin at the bottom of the cavities was then covered with antiseptic paste (camphor, ac. carb. conc., ol. eucalypt.), sealed with air and watertight filling-material, and thus left for 5-19 months, all micro-organisms were found destroyed, with the exception of Bacillus gangrænæ pulpæ.

No comments of mine on the above data are here necessary. Dr. Williams's "Contribution," etc., is fresh in the memory of all readers; they will no doubt draw their own conclusions when they have placed the phenomena observed by him and his predecessor, Dr. Vicentini, in proper contiguity with this contribution of Arkövy and the previous works of Miller and others.

THEODORE SÖDERBERG.

SYDNEY, AUSTRALIA, May, 1899.

PRODUCTION OF ARTIFICIAL CARIES.

TO THE EDITOR OF THE DENTAL COSMOS:

Sir,—In the report of the discussion on Dr. Williams's paper, entitled "Certain Controversial Questions and Unsolved Problems in Dental Histology and Pathology," on page 377 of the DENTAL COSMOS for April, 1899, I am reported as saying, "I think in Dr. Miller's first work he did make that statement, but in his later work, and in some correspondence which Dr. York had with him, he changed his first statement. He first made the statement and then withdrew it." My remarks were incorrectly reported, and should read: "I think somewhere in Professor Miller's works or correspondence it is stated that he had produced artificial caries with pure cultures, but in his last work or correspondence he did not make the claim that he had isolated the Leptothrix innominata and produced artificial caries with the Delta group."

To further substantiate the above statements, I desire to quote from a letter recently received from Dr. York, dated Berlin, May 10, 1899, in which he states Professor Miller's views on this subject in a very concise manner. Dr. York writes,—

"Professor Miller does not lay much stress upon Koch's method,—namely, from pure cultures, in demonstrating caries of the teeth. The question to be settled was not whether one bacterium or another produced caries, but rather whether caries is the result of the activity of bacteria, and in the solution of the question it is not at all necessary to produce artificial caries by pure culture; although he did so in 1884, and described the experiments in the *Independent Practitioner,* month of March, I fancy.

"In producing artificial caries it seems reasonable to make the experiments under conditions as similar as those found in the mouth as it is possible to make them. Now, we never have a pure culture of any bacterium in the mouth, and when we are working in pure cultures we are making the conditions of the experiment unnecessarily artificial. At the same time, it is of interest to know whether this or that particular bacterium can alone produce caries of the teeth, and to determine this naturally it would be necessary to operate with pure cultures. It is very probable, as stated in his work on 'Micro-Organisms of the Human Mouth,' pages 183 and 184, that different kinds of bacteria operate with different rapidity on the teeth, and it would be interesting to know which kind bring about the greatest destruction in a given time. It is also quite within the bounds of reason that we may have bacteria in the mouth which are capable of producing an acid fermentation which may therefore decalcify the tissue of the tooth; in other words, produce the first stage of caries, but which may not have the necessary peptonizing action to bring about the second stage. It is also equally possible that there may be bacteria in the mouth which do not produce an acid fermentation, but have pronounced peptonizing properties. Such bacteria would be particularly active in the second stage of caries. Naturally it would require a vast amount of experimentation to determine these points.

"On the other hand, it is certain that there are various kinds of bacteria in the mouth which have both acid-producing and peptonizing properties. Such bacteria would, of course, be active in both stages of caries. All these questions have been touched upon in Miller's writings long ago, both in the dental journals and in his work.

"Professor Miller did not seem inclined to make any statement regarding the view, of late so often expressed, that the acid produced in the mouth by fermentation does not act upon the teeth unless the micro-organisms grow in actual contact with the teeth, and be also covered in with gelatinous plaques, to prevent the dissipation of the acid in the currents of saliva."

J. E. HINKINS, D.D.S.

CHICAGO, July 12, 1899.

CORRECTION.

TO THE EDITOR OF THE DENTAL COSMOS:

Sir,—In the June number of the DENTAL COSMOS there is a slight error in the report of my remarks; the last word on page 578 should be *ungrateful,* which was the word I used. The types have made it "ungracious." You will see the difference the words make to the sense of the sentence. By correcting this you will greatly oblige

W. MITCHELL.

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Grosvenor Square, London, Eng.

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PROCEEDINGS OF SOCIETIES.

NATIONAL DENTAL ASSOCIATION—SOUTHERN BRANCH.

(Continued from page 647.)

FIRST DAY—*Evening Session.*

AFTER reading the minutes of the preceding session, L. M. COWARDIN, D.D.S., Richmond, Va., read the following paper:

THE TOO FREQUENT SACRIFICE OF TEETH, IN THE TREATMENT OF DISEASES OF THE ANTRUM.

It is well known that the forms of disease most frequently affecting the antrum are mucous engorgements, both simple and purulent. The suppurative is usually caused by alveolar abscess.

In consulting authorities, four of which I now have before me,—Garretson, the "American System of Dentistry," Bryant, and Marshall,—I find that in the treatment of these diseases of the antrum they all recommend the extraction of the teeth. Where a tooth has given rise to the trouble they recommend its extraction, or where no tooth is the cause they advise the extraction of the second molar, upon the ground that its roots approach the antrum at the most dependent point, and will afford the best drainage.

Having had considerable experience in the treatment of these forms of antral diseases, I came to the conclusion several years ago that it was an error to sacrifice teeth in order to effect a cure, and determined to treat the first case that came to me without extracting the tooth.

About two years ago Miss H. called on me for treatment. She complained of pain in the region of the first molar, but the symptoms indicated both pulpitis and apical pericementitis. The first molar had had the pulp devitalized, and had been filled with a large amalgam filling, and was the tooth which gave symptoms of pericemental trouble. The pulp in the second bicuspid was found to be exposed. The pain was promptly relieved by an application of carbolic acid. The patient was made so comfortable that I felt sure that the cause of her trouble existed solely in the bicuspid, so discharged her, to return the second day following for an application of pulp paste.

In the mean time the pain in the cheek became more diffused and less acute. The molar gave no greater signs of inflammation about its roots. I applied the paste in the bicuspid, but it caused such great pain that I was compelled to remove it before she left the office, and applied the carbolic acid, which again speedily relieved her. On this day, owing to the diffused soreness in the cheek, I had some suspicion of antral trouble, and decided to await developments.

The relief being so great from the last application of carbolic acid to the cuspid, I again discharged her for a rest of two days. On the morning of the second day her eye (conjunctiva) became congested, and there was so much soreness in the orbit that she determined to see an oculist.

By this time the disease had so far developed that antral trouble was easily detected. The eye specialist sent her back to me with the request that I would extract the tooth. This I declined to do, and told the patient that I could cure the trouble without the loss of the tooth. To this she readily assented, and I turned her over to my assistant, with instructions to treat the tooth as in the case of an ordinary alveolar abscess. This he proceeded to do, also treating the bicuspid. He accomplished this treatment in four days. For the relief of the antrum I made an opening through the canine fossa, and treated the antrum daily by syringing it with peroxid of hydrogen, followed by salt water (normal).

On the third day I found no sign of pus, and discharged the patient for two days. When I again saw her there was still no pus, so I dismissed the case. Since that time the patient has several times returned to my office for other work, but there has been no return of trouble in these teeth or the antrum.

I regret that cases of antrum trouble do not present themselves more frequently in my practice, thus enabling me to substantiate the treatment herein set forth.

I related this case to one of my graduates, and he has just given me the history of a case which by my advice he has treated in a similar manner with a like result, and which, with your permission, I will read.

"In August, 1897, I was called upon by a lady to do some general filling. Among the work was an upper right second bicuspid with a chronic abscess, which the patient said would swell and discharge from time to time.

"Upon inquiry I got the following history: She was thirty-six years of age; had suffered with atrophic rhinitis for about twenty years; the abscess was of several years' standing; upon blowing the nose she would at times notice the presence of pus, which came from the nostril of that side, and there was more or less dull pain about the region of the antrum.

"She had been for several years under the care of a specialist who treated her for catarrh, telling her he could not effect a cure, but could hold it in check by palliative measures. She had not been to him now for about six months.

"From the history and symptoms I saw that she had antrum trouble, but I was not satisfied that the tooth was the cause. I told her my diagnosis, but she was inclined to doubt it, as a dentist had on a previous occasion told her the same in reference to the other side, and it had proven not to be the case. Along with the other work, I treated this bicuspid, and with some difficulty succeeded in curing the abscess and permanently filled the tooth.

"I heard no more of the case for three or four months, when one day she returned, saying her physician said there was pus in the antrum, and that this tooth must be extracted in order to evacuate the pus and treat the part.

"Upon examination and inquiry I found that the tooth was doing good service; the fistula healed, and the tooth giving no trouble in any way. She still complained of a pain in the face and soreness in the first bicuspid and cuspid when tapped with an instrument.

"I explained to her that it was unnecessary to extract that or any other tooth, as an entrance could be effected through the canine fossa. She preferred this or any other method whereby the tooth could be saved. She reported this to her physician, who agreed to have it treated by this method.

"I opened the antrum in this manner, and pus followed the withdrawal of the drill. I syringed it first with warm salt water, and then with hydrogen dioxid. I found that the hydrogen was giving considerable pain, the membrane being in a very irritable condition, so I discontinued its use for a while, using only carbolized water to soothe and tone up the membrane. Then again used hydrogen dioxid greatly diluted and gradually getting it up to full strength, always using afterward a saturated solution of boric acid.

"The cure was delayed on account of complication with ethmoid disease, pus discharging from these cells and keeping up the infection. The presence of pus became less and less evident, until in about seven weeks the solutions would come through the nostrils perfectly clear and free from pus.

"I have seen the patient within the past week, being now more than a year since treatment, and she reports no further trouble either from the antrum or the tooth.

"As ethmoid disease is not an uncommon accompaniment of atrophic catarrh, it may be that this was the primary trouble, and that the antrum was infected from it rather than from the tooth.

"However, the point I desire to illustrate is that of treatment of the antrum through the canine fossa, rather than by sacrificing the tooth. WM. D. WILLIS, M.D., D.D.S."

Discussion.

Dr. J. P. CORLEY. I am sorry to say that, as dentists, I think we do not go into surgery as we should do. Dentistry was formerly a mere handicraft, its followers classed with watchmakers and barbers. The oral surgeon of the twentieth century must be a therapeutist, a physician, a physiologist; he must be as familiar with all the organs of the physical human being as the practitioner of any other specialty.

I am not prepared to enter into the scientific discussion of this subject, but if I may be permitted I will cite some cases from my practice. I see no reason why it should be necessary to sacrifice the teeth in the treatment of the antrum. Nine out of every ten cases of empyema of the antrum are due to the presence of devitalized teeth in close proximity to the antrum. The opening through a root-canal is often sufficiently large for treatment and drainage of the antrum. In a recent case, in which the second molar was involved, I opened, cleaned, and filled the buccal root. I then opened the palatal root and placed in the canal a platinum cylinder, which I cemented in with oxyphosphate, filling the pulp-cavity around the cylinder with amalgam. Inserting the nozzle of my syringe into the tube I was able to inject tepid salt water, dilute listerine, carbolized water, etc. The patient continued the treatment at home, and in two weeks it was well; and there has been no return of the trouble. An objection to treating through an opening in the canine fossa is the flap of soft gum-tissue, which is in the way; and then you do not get an opening into the base of the cavity, but nearly always into the side; and then, too, it is necessary to insert a drainage tube or the opening will close up. Unless the nozzle of your syringe goes in through the alveolar process, you cannot force the contents out through the small opening into the posterior nares. By injecting through the tooth you can use more force. Trouble is sometimes due to a closure of the little duct opening into the posterior nares, causing an accumulation of degenerated secretions. If a tooth is removed there will be more or less shrinkage and absorption, and it may be necessary to wear a plate to keep food from entering and to preserve the opening. The *rationale* of treatment through a tooth is good. I would prefer rather to devitalize a sound tooth if necessary and treat through the canal than to remove a bad tooth and treat through the socket. I am aware that *reporting cases* is considered empirical, but I had to use the material at hand in discussing this paper without preparation.

Dr. T. C. WEST. I would like to ask Dr. Cowardin where he prefers to open into the antrum? I had a case in which the patient was kicked by a horse, breaking through into the antrum between the cuspid and the first bicuspid. I removed considerable necrosed bone, and inserted a silver tube with a flange to cover the opening and avoid the trouble with the flap of soft tissue mentioned. Before coming to me the patient had been under treatment for a long time without receiving any benefit. I washed the cavity out with salt water, and began at once to treat with iodoform vapor, using Blair's vaporizer, till the vapor came out through the nostril. I had one case which a physician brought to me, to insert a tube for a patient who had no teeth. He broke the end of the tube off, and the rest of it is still in the cavity; at least I have never been able to find it. What would you do about it, and where did it go to?

Dr. Frank Holland. Does Dr. Cowardin wish to be understood to say that he can get an opening through a root-canal sufficiently large to treat extensive cases of diseased antrum?

Dr. Cowardin. My paper was designed only to show a method of treatment by which a tooth might be saved instead of removed.

Dr. B. Holly Smith. Certain cases of diseased antrum require very extensive removal of the floor, so that the cavity can be freely explored with the finger, and so that the interior may be thoroughly curetted. Cases that have been treated for months and years on the conservative plan will yield readily to a radical operation. Oral surgeons always make radical operations for antral troubles of long standing where throat and other specialists decline to operate at all for acute inflammation associated with rhinitis. They often clear up and yield to general treatment. I am inclined to think entering and draining the antrum through the root of a tooth inexpedient and unwise. The treatment would require longer time and more concentrated medicines than by other methods.

Dr. L. G. Noel. With regard to the conservative treatment advocated by the essayist, I would say that when these cases have run along several years they are often complicated with nasal catarrh, the entire mucous surface being involved in the trouble. When it is a question between saving a tooth and being embarrassed by the presence of the tooth, it is better to sacrifice even a good tooth, if that will give assurance of satisfactory results. I indorse what Dr. B. Holly Smith has said; we need a large opening, sufficient to pass in a little finger. We often find the antrum composed of several small cavities divided by septa. By having an opening sufficiently large the septa can be removed, and the entire cavity opened to treatment. I believe the opening should always be at the bottom. With all deference to the brother from Baltimore, I think it better to open through the buccal alveoli. In one case I removed two teeth—the first and second molars—in order to get direct access. As for treatment, I prefer to use Lugol's solution of iodin. It is very miscible in water, and eight or ten drops in a quart of water, used with a small piston syringe, gives very beneficial results. Some years ago I read a paper before a medical society on this subject. A physician present said his own antrum was under treatment, and that he could not stand such strong solutions; that it would be too painful.

When the roots of the molars penetrate the antrum they may be covered only by a membrane, which, in case of alveolar abscess, is raised up by the forming pus, and there will be no opening to the nares. The products of the abscess may so distend the membrane that the entire antral cavity may be filled, but with no point of exit, thus rendering diagnosis difficult. A mild solution of boracic acid is often very beneficial. I do not believe in drainage tubes, and never use them. With a large opening in the molar region a plate must be used to prevent the entrance of food into the cavity, but it will drain itself. Often in the extraction of teeth roots are pushed through into the antrum. On one occasion, in washing out a diseased antrum, I washed out a portion of root, which had been forced into the antrum by some previous operator.

Dr. L. M. Cowardin. It is very evident that to open roots indiscriminately for the purpose of treating the antrum through a root-canal is not feasible, and was not suggested in the paper. The method is not offered as one adapted to the treatment of diseased antrum in general; it is offered as a desirable method in the treatment of purulent empyema, from whatever cause. Dr. Corley's objection to treating per the canine fossa, because it is possible the opening from the antrum into the middle meatus may not be patulous, is not well taken. The method is of course contraindicated when a free opening does not exist, but when the natural opening is not free the opening in the canine fossa should be made large enough to allow free discharge when injections are made. We should not dare to use force, as this is apt to extend the disease to the frontal sinus and the sphenoidal sinuses. There is no necessity for drainage; with the aid of peroxid of hydrogen we can get rid of every iota of pus. Sending peroxid of hydrogen through the wound in the canine fossa, elevating the stream as it is injected, it will pass over the septa and froth out the decomposed secretions from the pockets that may exist. Normal salt solution may then be used to flush the antrum, and any that may not pass out at the natural opening will be freely absorbed by the tissues of the cavity; salt water alone will not wash out the pus. My experience with this method has been such as to prove its efficacy.

I am glad to hear Dr. Noel say he does not believe in tubes. I recall one case that had been treated for two years by a specialist. The patient was sent to me for removal of the second bicuspid, which caused the trouble. I removed the tooth, and the case was treated as just stated for two years, at which time the patient came to me and *with a very big D*—— said he would not return to the specialist. I replied, "If such is your decision I will take the case." I removed the tube, washed out the cavity once only with the salt solution, and he has never had any trouble since. The truth is, he was cured when he came to me, and had been for a long time.

Another case which had been treated in vain for more than a year came to my assistant. As it did not yield readily to the treatment with peroxid of hydrogen and salt water, I concluded that it was either a case of some disease not benign or of some foreign substance in the cavity. I accordingly advised him to examine the antrum for foreign bodies, and found the root of a tooth and a broken canula. This is not infrequently the hiding place of a "mysteriously disappeared" root. The case was soon dismissed cured.

Dr. Noel. Does not peroxid cause severe pain when injected into the cavity?

Dr. Cowardin. If three per cent. solution is carefully used, and the patient properly instructed, there will be no great pain or trouble.

The patient should be instructed to hold up the palate, and not let the peroxid go into the fauces; this will prevent gagging. I have put campho-phenique through the antrum and nose with no complaint of pain on the part of the patient or causing irritation. I have opened through the canine fossa and cured many cases in less than two weeks. It is essential to maintain the opening patulous with a tampon saturated with weak carbolic acid.

Professor R. C. Young, D.D.S., Anniston, Ala., then read a paper of which we give an abstract, as follows:

Oral Surgery. A Case in Practice.

Mr. President and gentlemen, with your permission I beg leave to report a case in practice, which I think will be of interest.

Last June a year ago I was called from my office to a neighboring drug store in great haste. Some one had been hurt, and I was wanted, so the message came. Taking my pocket case and excusing myself from a patient with whom I was engaged, I went. Immediately upon my arrival, in the rear part of a drug store, where all receivers of accidents, it seems, are brought, I found sitting upright in a common, split-bottom chair the most ghastly object it has ever been my fortune to see. A man some twenty-three years old wrapped in a sheet saturated with blood, and holding in his hand a dangling, unshapely mass of bone and teeth, the whole side of the face torn out. Two physicians and a gaping, horror-stricken lot of drug-store help were standing by. The poor unfortunate was perfectly conscious. Calling a couple of the bystanders, I had them lay him upon the floor until I could improvise an operation table. The patient complained of being cold, though the mercury stood somewhere near the nineties. I had him covered up, and began an examination.

The man was an operator in one of the local cotton mills. To adjust a belt he had climbed up a ladder, one end of which rested on a revolving shaft, the other upon a slippery floor. The ladder fell, throwing him upon a machine. He must have had his mouth open, as the following will show. The right cheek was cut open from the inner canthus to the commissure of the lip, from a point about over the glenoid cavity, joining cut about on a line with the ala nasi, a deep cut straight across upper lip just under the nose. A number of minor punctures and lacerations presented further complications. Upon the chin were six or eight cuts and punctures. The nose had a multiple fracture and was driven over to the left. The whole of the upper right maxillary bone had been cut and torn completely from the face; was dangling over the chin, held by a small connection of gum-tissue just over the lateral and cuspid teeth, not wider than a lady's thumb nail. An idea will be conveyed if one will think of a pedunculated flap cut for skin-grafting. The bone had to be held to keep it from swinging about at each movement of the head. The cleft had been severed just at the median line between the centrals, along the line of articulation with opposite maxilla; thence along naso-maxillary articulation to floor of orbit; thence across to malo-maxillary articulation; thence to spheno-maxillary foramen, across hard palate from incisive foramen to articulation of palate bone with pterygoid process of sphenoid.

Raising flaps of wound in the cheek, the optic nerve could be seen and touched just as it enters into the sclerotic tunic; passing the finger down the pharynx the pterygoid process could be felt, rough and jagged where articulation had been torn loose. The floor of the orbit was in plain view, and I thought, as I held the bone in my hand, what an opportunity to study a fresh antrum. But now was a time for action and not study. Nothing had been done for the patient but a hypodermic of morphia and strychnin, a most excellent means of preventing or controlling shock. He had been driven in an open buggy at least two miles. The hemorrhage, as you can imagine, must have been very profuse. Here is a point worth noting: The wound had been made with a blunt instrument, was more of a laceration and wrenching apart, dragging the vessels out to their utmost, tearing them in two, so when they broke they contracted much as though torsion had been used. This, I believe, must have saved the man's life, as otherwise he would have bled to death before assistance could have been had. The hemorrhage was still considerable when I reached him. There was a porcelain vessel of hot water at hand; with an ordinary household syringe (new), I douched the parts with hot alum water. This brought the hemorrhage well under control. The arteries had so contracted that they could not be taken up. There was still a slight hemorrhage, which did not entirely stop until next day.

I was entreated by the superintendent of the mill to save the bone, which contained all the teeth on the right side from the central to the third molar, including tuberosity. One of the physicians, as soon as he saw the case, said, "This here thing must come off," but it didn't. After thorough examination on general principles, with hands and instruments well sterilized, I removed spiculæ of bone, and, after pointing out optic nerve, pterygoid process, and some other points of interest, went to work.

Now came the "tug of war." I could get but little assistance. When I placed the bone in position the anterior or cheek part would be well aligned, but the palate or distal part would not fit, and *vice versa*. After several futile attempts, I decided the facial aspect was more important, so got it nicely adjusted, which I assure you was not unlike putting together a Chinese puzzle. Now, how was the part to be held in place? A splint was out of the question. There was nothing in view to suture to, no place where attachment could be had by drilling. My only hope was a ligature caught in the gum over first molar, carried through cheek, and tied outside just under the eye. Two ligatures were used here, and held the bone well up. Then, with a modification of Brophy's operation for cleft palate, I passed a wire suture through the edges of the wound on hard palate; thence between the teeth on the opposite side, twisting the ends of the wire together. Three wires were used, which held the bone laterally. A wire was passed from cuspid to cuspid. Thus I had the bone held in three ways. I found the lower incisors knocked out and broken off. Process driven back so the teeth pointed down the throat. This was easily replaced and held by wire. The bone being in place, the nose was now given attention. I found the bone fractured in several places, and the nose much displaced to the left. After reducing the fracture, I inserted into the nostrils two rubber tubes the size of my little finger. The rubber was quite thick, ribbed, not smooth. The ribs gave drainage, the tubes held the parts well and allowed the patient to breathe through the nose. Forty-odd stitches were taken in the soft tissue, silk being used. Some of the ligatures were very fine, the common size being split to get them small enough. About the thirty-fifth stitch I found my fingers so paralyzed from the carbolic solution in which ligatures and instruments were saturated that I could not push the needle through the skin on chin, and had to get one of the physicians to assist in the last few stitches. In the corner of the lip was a piece of tissue about the size of the rubber eraser on an ordinary lead pencil, hanging by a meat thread, so to speak. It was almost black, but, if lost, would make an ugly deformity. It was thought best to remove it, but I was anxious to give it a chance. With a very fine needle and delicate silk thread two stitches were taken, and I was gratified with the result after recovery. I trimmed it down, and was rewarded with a perfect mouth. The external wounds were dusted over with aristol. A linen cloth, on which had been put some simple cerate, was placed on, and over this absorbent cotton. The whole was done up with a Gibson bandage, the patient turned over to a physician, with instructions to syringe the mouth three times a day with a ten per cent. solution of boric acid, using the household syringe. I saw the patient next day; the face was fearfully swollen and much discolored. There was but little fever; had rested fairly well during the night; gave saline cathartic and quinin. Third day dressing was removed; found some pus. Wounds inside and out cleansed with a three per cent. pyrozone; head and face still very much swollen, but color improving. Patient restless and nervous, had great trouble to keep him quiet.

Strict attention was given to diet and hygienic surroundings. After the fifth day he began to improve rapidly, and continued to do so. The second week he was able to sit up, and he gained strength daily. He was still under close surveillance. The physicians rendered valuable assistance, carrying out the treatment to the letter. After the third week he was able to come to my office for treatment, which I had him do twice a week. The dressing of the parts was still kept up twice a day by his wife, who was now quite handy at it. As a tonic he was given phospho-muriate of quinin compound, Phillips's. The man made a perfect recovery; the external wounds left a wonderfully small amount of scar; the nose was perfect; he used his teeth as though they had never been out of his head. The third molar and its surrounding alveolar process, with tuberosity, were exfoliated. All the other teeth in the upper jaw are sound and seem to be alive. There is a small opening in the hard palate, where, through loss of tissue, union failed, but gives no inconvenience, and will, I think, almost fill up in time. I reduced it very much by paring the edges of the break and stimulating granulation.

I saw the man last about six months ago. Nearly eighteen months had elapsed since the accident, and he said he was as sound as before he was hurt.

I report this case simply to show the wonderful recuperative power of the facial regions in accidents affecting these parts. An effort to save every part should be made. The ingenuity of manipulation, the familiarity with the minute anatomy of the parts, the realization of strict attention to asepticism makes the dental surgeon peculiarly fitted to attend to this class of accidents.

Dr. WM. ERNEST WALKER. I saw this very remarkable case a few months after the operation. The face was scarred somewhat, but not very badly. There was still a small opening in the hard palate, which had not quite filled in.

The following paper, of which we give an abstract, was then read by Dr. C. B. JOHNSTON, Monroe, La.:

A CASE IN PRACTICE.

Mr. President and gentlemen, this article, not written by myself, but by a personal friend of the patient, Captain Myatt, and also of myself, shows what is possible to be done with the dental engine in the hands of a dentist. I will now read the case, and give my treatment afterward.

"A REMARKABLE CASE.

"A dentist of Monroe, La., brings to light the hidden mysteries and freaks of the leaden missiles of the late Civil War, and performs a delicate surgical operation, one highly creditable to surgery and his profession.

"Captain Alex. Myatt, a now well-to-do merchant and planter of Ouachita Parish, during the late Civil War was a member of Company K, Thirty-first Louisiana Volunteers, and during the siege at Vicksburg, on the 10th day of June, 1863, was wounded, supposed to be fatally, being shot in the right eye with what is now supposed to be a Springfield rifle ball of about fifty-five caliber.

"This ugly missile, while not taking a proper course or direction to produce death, has for more than a third of a century been a source of torture and punishment to the victim of its range.

"When wounded the best surgeon of the Confederate army considered the wound of Captain Myatt fatal. He remained in the hospital until the fall of Vicksburg, which occurred on the 4th day of July following. After the surrender of the Confederate forces to the Federal army, General Grant, who was in command of the latter forces, while visiting the Confederate hospitals, had his attention called to the nature of this wound, and at once became so interested in the case that he ordered his staff surgeon to visit the patient and examine the wound of Captain Myatt. This physician and surgeon of national fame, after making a careful examination, agreed fully in the diagnosis made by other surgeons,—namely, that the bullet, after penetrating the eye, had taken a due backward course, lodging in the back part of the head, which would make its location and removal impossible without immediate danger to the life of the patient. On the 17th of July, something more than a month after receiving this wound, Captain Myatt, with the other wounded soldiers, was paroled and sent home.

"His wound was of such a nature as to prevent his return to the service at any time during the remaining period of hostilities, at the close of which Captain Myatt found himself not only a financial but also a physical wreck. Notwithstanding this, however, he entered the battle of life with the same courage and determination that had marked his course in the service of his country, carrying this ugly missile of war for the past thirty-five years in his head.

"In all these years of torture this man has visited and consulted, at various times, some of the most eminent physicians and surgeons of the South, all of whom declared their inability to give permanent relief or advise any course that would eventually lead to a removal of the bullet.

"Now comes the strange feature of the case.

"After all these long years this man, carrying a Springfield rifle ball so near the most vital part of his body, suffering untold pains, consulting at different periods some of the most scientific surgeons of the country, and all to no purpose, except occasional temporary relief, was to be at last relieved by a dentist.

"During the fall of 1898 Captain Myatt called on Dr. C. B. Johnston, of Monroe, La., to have him remove what Captain Myatt supposed to be a broken tooth. But, to the surprise of the patient and operator, in place of a broken tooth a leaden substance was discovered. Captain Myatt was so much surprised at this information that he was indisposed to give the statement any credence, and was not led to a full belief in the story until Drs. T. O. Brewer and R. W. Faulk, his family physician, were called, who, after an examination, assured him that such was the fact. Dr. Johnston, who made the discovery, assured Captain Myatt of his ability to remove the bullet, but as Captain Myatt strenuously objected to the use of chloroform or any other anesthetic, and the operation necessarily being painful and tedious, Dr. Johnston wired to his brother, Dr. J. F. Johnston, also a skilled dental surgeon, to come and assist him. Together the Doctors Johnston, by a process of sawing and drilling into sections this bullet, in the course of two or three days removed from Captain Myatt's mouth what had been a source of pain, amounting at times to almost torture, covering a period as far back as the siege of Vicksburg. This operation was so skillfully performed as to give the patient but little pain.

"This old veteran tells me that since the removal of this ball, or bullet, he has enjoyed life more than all the balance of the time since receiving this wound. He weighs twenty pounds more than he did when the bullet was removed, and, although now sixty years of age, he has gone into the battle of life with renewed vigor and energy."

Dr. C. B. Johnston. I will now give my treatment of this case.

After removing the bullet with my engine, dividing it into several parts, my first idea was to close the opening from which the bullet was extracted. But that was not practicable. Next I thought of making an artificial substitute, but abandoned that for fear of an abscess resulting. I finally adopted the following plan:

After removing the bullet, by cutting it into several pieces, I first washed out the opening with peroxid of hydrogen, and then packed it with dry cotton thoroughly impregnated with iodoform, removing dressing, washing the opening, and replacing the aforesaid dressing about every week or ten days. After the sixth or eighth dressing I discovered there was some little necrosed bone, some of which nature has thrown off. By careful examination you will see there is still some of this bone, but my idea is to give time and assist nature all I can to throw this off, as stated before.

Captain Myatt dreads and is afraid to take chloroform or to allow the use of cocain.

A piece or two of dead bone has been removed, or rather thrown off, since the operation, a small piece coming through the nose. The patient is now doing well and has enjoyed life much more, and his health is better than at any time since receiving the wound.

(To be continued.)

NEW YORK ODONTOLOGICAL SOCIETY.

A regular meeting of the New York Odontological Society was held at the New York Academy of Medicine, No. 17 West Forty-third street, on Tuesday evening, April 18, 1899; the president, Dr. Perry, in the chair.

The meeting was called to order at eight o'clock, and the minutes of the previous meeting read and approved.

Report of Clinic Committee.

Dr. J. F. P. Hodson. The clinic by Dr. Gaylord, of New Haven, was a very interesting one. The operation, which was upon me as a patient, was a fine one, and was to show particularly the manipulation of the new gold,—"moss gold." The onlookers were intensely interested, each one in turn taking the opportunity offered to himself insert and condense a few pieces of the gold, with which all expressed delight.

Dr. O. E. Hill. For the past ten days I have had rather an interesting case. A third molar in the mouth of a lady patient, with a very large amalgam filling in it, has been giving a great deal of trouble. There was some inflammation present, but there was no outward evidence or reason why it should give the immense amount of pain that it did.

I removed the filling, and became convinced after examination that the pulp was not exposed, nor was it nearly exposed. I used the usual remedies of carbolic acid and a little something on the gum, but all the time there was pain. Finally, the thing baffling me, I concluded to drill into the tooth. I did so, and found a thoroughly live pulp, which I killed. Still pain all the while. The patient came in this morning at half-past eleven, saying the pain was so severe she had to come back. The sensitiveness had gone, so I opened into the cavity and took out a good-sized pulp-stone. There was the cause of all the trouble. I think the lady was in the habit of wearing a sealskin sacque, one of those very fashionable affairs, like a Russian horse-collar, and a few days ago she left that off and got in an open car with an ordinary cloth sacque on; I think that started the inflammation in the pulp of that tooth.

Dr. Hodson. I should not be in the least inclined to agree with the last speaker that the cause of the pain was the cold that was taken so soon previous to the expression of it. A pulp-stone takes a longer time to develop than this would seem to indicate, and a pulp-stone would cause this pain a long time previous to taking cold.

I am reminded of a peculiar case that I have in hand at present, a right upper molar around which on both approximal surfaces, front and back, the alveolus is necrosed. I have burred into the pulp-chamber of that tooth little by little, and found an entirely live pulp, and can find no reason whatever for any such necrosis of the alveolus. That is the whole case in a nutshell. I am expecting to very much improve, and have already improved, the surrounding condition of that tooth by the diversion of the nutrition of the pulp into periosteum; but there is no pyorrhea in the mouth, no suggestion of it, so it is not from such a cause.

Dr. J. Bond Littig. Has she been a patient of yours for some time?

Dr. Hodson. Yes.

Dr. Littig. Are any pulps destroyed in the adjacent teeth?

Dr. Hodson. No; the pulps quite alive in all the teeth; many fillings, but all perfectly filled at the cervical borders. This has been a very obscure case to me. Why the alveolus should voluntarily die, all the surrounding teeth being healthy, I am wholly unable to define. Her directing my attention to it was in consequence of the gums being so inflamed as to be badly bleeding. My own attention was not called to it until she told me that, because the gums were not enlarged. I examined there with an explorer, and found a very considerable necrosis.

Dr. L. C. LeRoy. May I ask if a separator had been used in these teeth?

Dr. Hodson. Surely, no. I took hold of the case for immediate work, more from fear that there might be troubles consequent than that the matter was giving much trouble at present.

Dr. Hill. What has been your treatment?

Dr. Hodson. Opening to and destroying the pulp and striving to divert more nutrition into the exterior membrane than had hitherto been given to it, because the nutrition had been divided between the pulp and periosteum.

Dr. Littig. Apropos to this case, about a month or so ago I tried to relieve a patient of some congestion about a tooth. She had just arrived from Europe, and said she had had the pulp destroyed there; and that she had not had any swelling, but had constant annoyance since. In examining about the tooth, which was very much congested, I discovered the septum of the alveolus between the two bicuspids was loose, and I removed quite a portion of it. I attributed that to the escape of arsenic in the attempt to destroy the pulp. I do not know whether I was correct in that diagnosis or not, but the tooth has been doing very well since I removed that, and when I asked whether there had been any pulp destroyed I had an idea something similar had occurred.

Dr. Hodson. I meant to have said in my remarks that the appearance was decidedly like that, and I would have supposed that something of that sort had taken place. It was exactly equivalent to what would have obtained from the leaking of arsenic, but no pulp has ever been destroyed there by any one else or myself, and I am sure nothing of that sort could have obtained.

Dr. Le Roy. If I may add a few words, I would like to cite a case that came under my observation that was induced by the application of cotton between the teeth for the purpose of separating them. After putting the first piece of cotton in place, I instructed the patient to follow that procedure each day until the proper separation was obtained for the cavity to be filled. When the patient presented, the cavity was filled. As is usual, I believe, there being nothing to indicate contrary, the space was allowed to care for itself subsequently, not thinking it was necessary to give other attention to it. The patient presented two weeks later with a condition of inflammation of the gums about those teeth, and upon examination I noticed that necrosis had set in. I had noticed at the time of filling the cavity that there was some inflammation at the gingival margin, but thought that was because she had placed the cotton too high in the approximal space. That condition I attempted to allay, and was successful within a week or so; but I think the real solution of the trouble was faulty nutrition. There has been a tendency for the gum-tissue to recede from the cervices of many of the teeth, and I believe it is due to a lack of nutrition at those points, and upon the slightest provocation would leave the way open for another necrotic condition. It may be of interest to state that the perchlorid of iron seemed to revivify the tissues after the first application. That preparation was of great benefit in another case of necrosis, following the application of arsenical paste to a tooth-pulp.

Dr. Hodson. Other things being equal, I should have the tooth out at once; but the woman is having a very bad time with her heart, and all shocks of any sort, even taking out a tooth, much less taking any anesthetic, have been interdicted, and I do not know quite what to do. I am treating in a general way, as one would naturally in a necrotic condition.

Dr. Hill. How is that?

Dr. Hodson. By burring out and using sulfuric acid.

Dr. Hill. How strong a solution of sulfuric acid?

Dr. Hodson. Ten per cent.

Dr. Hill. In my opinion, this ten per cent. solution is entirely too weak. If you will put a fifty per cent. solution in and let it stay there, using a little cotton saturated with carbonate of soda to protect the surrounding tissue, you will get better results. I think the use of a bur in these cases is all wrong; a bur leaves not only a roughness, but injures the healthy bone.

Dr. Hodson. I do not agree with the last speaker in that. I have a great deal more confidence in the bur to remove the dead, necrosed substance, and then using the more modest aromatic sulfuric solution. I do not believe in using a strong solution. I know perfectly well that it will not affect the healthy bone, but it will take too long for my purpose.

Dr. Geo. F. Eames, Boston. This case, it seems to me, is one of necrosis, and, if so, there is at some point an obstruction to the circulation, due to some local irritation or to the general condition of the patient, or both. In regard to treatment, nature will do the work of separation better than any artificial means, and I am of the opinion that the best treatment to-day should consist in the removal of septic and other abnormal products by the use of mild antiseptic washes, rather than in the severe measures that used to be employed. I believe that the disease has often been extended by mechanical means and by strong chemicals beyond the point where the line of demarkation would have taken place; especially do I believe that the use of solutions of peroxid of hydrogen in closed cavities has carried septic elements into the surrounding tissues and spread the disease. I feel that the mild method is the wise course.

Dr. Wendell C. Phillips. Apropos to this discussion, I would like to call the attention of the members of this society to a paper read by Dr. Seneca D. Powell, of this city, upon the use of carbolic acid in the treatment of bone-disease. I think there is a great future for this procedure, especially in caries, in those conditions of the bone wherever the germ element has come in.

Dr. Powell has suggested it in all conditions of dead bone, and it has some advantages over other preparations. You can use a solution of ninety-five per cent. carbolic acid, and it has been demonstrated time and again that, properly handled, you will do no harm by it. I adopt it in mastoid bone operations. It has another very great advantage, that there is a remedy that you can use that will immediately destroy its effects if you fear you have put too much on any portion of the bone, or if you feel that you have gotten too much of it upon the surrounding tissues, and that is alcohol. I would not be afraid to dip my hands in pure carbolic acid if I had alcohol handy into which I could also immerse them. Certainly, the use of pure carbolic acid in diseased bone has been very successful so far as our experience goes.

Dr. Hill. The gentleman who has just spoken has brought up a new idea in regard to carbolic acid and diseased bone. Ever since we were dentists we have used carbolic acid in abscessed teeth, pumping it through the root of the tooth; but we have never done it for the purpose of affecting the bone, only the soft tissues. Now, according to this idea, our carbolic acid pumped through has been doing more than we thought, inasmuch as it has had a beneficial effect on the diseased bone always present.

The President. It really is a curious thing how successfully carbolic acid has been used empirically, and how its use is confirmed by the later researches.

Dr. Wendell C. Phillips then read his paper, entitled "Some Observations upon the Sequelæ of Adenoid or Lymphoid Tissue in the Naso- and Oro-Pharynx."*

Discussion.

Dr. Eames, of Boston. Mr. Chairman, this paper has covered the ground so fully that there is very little to say except in commendation of it, and possibly to so present some of the points in a light which might emphasize them as they occur to me. In regard to the examination of patients, I have in times past inserted my finger behind the soft palate for the purpose of diagnosis, but I never do it now. I examine as well as I can by the aid of the smallest mirrors, and if I am in doubt I suggest that an anesthetic be administered, when a thorough examination can be made, and if the growth is present it can then be removed. I am convinced that the causes of irregularities of the teeth and of these overgrowths are one and the same,—some constitutional condition in which heredity plays a prominent part.

In the matter of removing the growth, I have often done it with the use of nitrous oxid gas alone. The method of doing it has been almost the same as described by Dr. Phillips,—the use of very large forceps, followed by the curette. The growth is examined, so that its location and size has been determined as fully as possible, the mouth is opened, everything is in readiness, and the forceps are introduced quickly and the handles opened widely, so that as much as possible may be removed at one grasp. Immediately I remove the instrument from the mouth the assistant tips the head forward; while the head is being held forward I pick up the curette, and as soon as the head is in position complete the operation, followed by an examination with the finger. This examination can be done quite well with the head tipped forward; in that way less blood is swallowed.

In cases which require a longer time for operation I administer a very small amount of ether, until the first effects are felt, followed by the nitrous oxid; and if very little blood has been swallowed it means less nausea and vomiting and straining of the parts, and the patient recovers much more quickly than if full anesthesia has been attained with ether alone.

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*Printed in full at page 743 of the current number.

Dr. LITTIG. I had but one idea in connection with this, and that was the application of the tongue; that where the arches were contracted there was generally mouth-breathing. We know that the upper arch is deprived of the action of the tongue in mouth-breathing, and, as the tongue is the prime factor in shaping the arch, I think, from a mechanical standpoint, that that is one of the causes of the narrowing of the arch.

I notice in the casts we have here there is a tendency to tip inward toward the center of the arch in many cases, and I attribute that to the inaction of the tongue.

Dr. LEROY. Mr. President, may I ask Dr. Phillips how frequently he finds these conditions recurring? I speak from an interested standpoint, for the reason that I have two children, both of whom have been afflicted with adenoids. They have been operated upon three times by a very good physician, a man who makes this naso-pharyngeal trouble a specialty, and each time it has recurred. After the first operation he said that the condition might have to be operated upon again. It was operated upon, and that time he pronounced it as being thoroughly removed. I examined the case myself before and after the second operation. With my limited knowledge it appeared to me that the adenoids were removed from the whole pharyngeal wall. Both patients were under the influence of *nitrous oxid;* the operations were performed at my home, in my office, and I administered the anesthetic.

As to the anesthesia, I think that nitrous oxid is by far more expeditious and satisfactory than the other anesthetics, either ether or chloroform, and the doctor who performed these operations administers nitrous oxid for many minor operations. He is connected with two hospitals in New York, and has quite an extensive opportunity for practice, and has instituted the use of nitrous oxid there also; he claims it is one of the greatest aids he has in the expeditious recovery of his patients after operation.

I think the medical profession will very materially profit by the application of that in their practice in the future, when they understand its safety and comforts to the operator thoroughly.

Dr. PHILLIPS. How long do you feel justified in giving gas?

Dr. LEROY. May I say a word in regard to the time in which it can be used, even in the removal of adenoids and a minor surgical operation which the doctor wished to perform at the same time? He requested me to assist him; in fact, I introduced that into his practice by suggestion, and I went so far as to volunteer my services whenever he required them at special times, generally on Sunday mornings, for that is a time when physicians have a great clientele and dentists do not as a rule.

One patient was kept under the influence of nitrous oxid by administering a series of times for almost half an hour. There is really no limit to the time that anesthesia might have been prolonged under these circumstances, but it was twenty-seven or twenty-eight minutes.

Dr. PHILLIPS. I have but few words to say in closing. I did not emphasize one point, perhaps, as much as I should, but the real fact is that the visual signs of the presence of adenoids are often sufficient for a diagnosis, and it is nothing uncommon for me to do the operation without having examined the case with either the mirror or my finger. I have never failed to find the adenoids when I have thus made the diagnosis, which is a very easy one to make.

I have had very little experience with nitrous oxid. You know that it is used to some extent in general hospitals for the beginning of anesthesia. In St. Luke's Hospital they commence with nitrous oxid and then give the ether. There is one anesthetic that I seldom use, and that is chloroform. Every year some man will come forward and say, "I always used chloroform till this year, but do not use it any more," on account of having a patient die under its influence. Ether anesthesia we know to be safe, and you can keep it up a long time without harm. It is a trying experience to take it, and if the nitrous oxid can be used, and used safely, I do not see any reason why it should not be done. The position of your patient is not important, although many operators seem to think it is. A perfectly level table will suffice, with the patient's head neither elevated nor hanging downward. Get the operation done quickly, and then turn your patient over and let the blood run out. So far it has seemed the best to me to use the ether.

I think Dr. Littig made the argument in regard to the formation of the upper jaw being largely brought about from the influence of the tongue in mouth-breathing. While the tongue is at certain times away from its location in the region of the hard palate, the tongue has to come up in that location in swallowing or deglutition. I am inclined to doubt whether that is a cause of the high arch.

I want to say that these casts were taken from the general run of patients; not all of these patients were mouth-breathers, but all had some marked symptoms of adenoids. Some of these had been operated upon, but the operation had only been done a few days. These were the general run of patients, such as might come in any day in hospital practice. The one that was particularly noticed by Dr. Littig, that had the appearance of having a high arch, was that of a fourteen-year-old girl, who had both adenoids and tonsil enlargement. I am inclined to think that any deformities of the jaw or teeth arising from adenoids come only after the condition has existed for some years.

Now, there is a suggestion I want to make. It seems to me that if some man would take the pains to get a large number of casts of all adenoid patients in a number of clinics, it would be of a good deal of benefit and help in settling this question. If there is any one inclined to do it, the doors of the Manhattan Eye and Ear Hospital are open to any dentist that will do so. I suppose we could take six or eight almost any day, and it would not take long to get a very useful collection.

Dr. Littig. It would be a good idea to take both jaws.

Dr. Phillips. I have found that the dentists are as busy as the doctors are; the only hours this work could be done are between two and four in the afternoon, and the lectures are given at these hours, and so students cannot come.

Dr. LeRoy raised the question of recurrence. When I have a recurring case I am always a little suspicious that I did not get my operation as complete in the first place as I should have done. It is not at all likely that the doctor who did that did not do his work thoroughly. It has been well authenticated that these growths do recur, but the cases in which they recur are very rare; and it is a surprise to me that two children in one family should have a recurrence. Have they recurred for the third time?

Dr. LeRoy. They have recurred for the third time. There have been three operations so far; the two latter times I examined the mouths.

Dr. Phillips. One of the gentlemen raised the question of bleeding. Free bleeding may always be expected, and it is an indication that the adenoids were really present. You rarely get secondary hemorrhages. There have been but a few deaths from secondary hemorrhages.

Adjourned. W. J. Turner, M.D., D.D.S.,
Editor New York Odontological Society.

HARVARD DENTAL ALUMNI ASSOCIATION.

On Monday, June 26, 1899, for the third consecutive time, "Alumni Day" was celebrated at the Harvard Dental School by the Alumni Association, with nearly one hundred and fifty individuals present.

The exercises consisted in the exhibition of models and specimens of work, with patients present, showing what the students have accomplished during the year by the Freshman, Junior, and Senior Classes, as well as results accomplished by the various professors and other officers.

Papers on three subjects and a symposium were presented, and clinics on four subjects given.

The twenty-eighth annual banquet occurred in the evening at Young's Hotel, Boston, with one hundred and seven individuals seated.

The annual address was delivered by Rev. George C. Lorimer, D.D., pastor of Tremont Temple Church, Boston, upon the subject of the "Making of American Character." Other speakers were Dean Eugene W. Smith and Prof. Thomas Fillebrown on behalf of the school, and Dr. Frederick A. Stevenson, of Montreal, P. Q., a graduate of eleven years' standing, and for the Class of 1899 Herbert A. Reed happily responded.

Officers elected for the ensuing year were: Edwin C. Blaisdell, '83, Portsmouth, N. H., president; Cecil P. Wilson, '72, Boston, Mass., vice-president; Waldo E. Boardman, '86, Boston, Mass., secretary; Harry S. Parsons, '92, Boston, Mass., treasurer. Executive Committee, Waldo E. Boardman, '86 (*ex-officio* chairman), William P. Cook, '81, Patrick W. Moriarty, '89, all of Boston.

The officers of the association compose the association.

WALDO E. BOARDMAN, *Sec'y.*

COLORADO STATE DENTAL ASSOCIATION.

THE annual meeting of this association was held in Denver, June 13, 14, and 15, 1899. About one hundred members and visitors were in attendance. Papers were read by Drs. E. R. Warner, Arthur C. Watson, J. M. Norman, F. F. Graves, and Sarah May Townsend, of Denver, and J. N. Chipley, of Pueblo. These were all freely discussed. Clinics were given by Drs. W. T. Chambers, H. F. Hoffman, W. E. Griswold, and L. S. Gilbert.

The officers elected were as follows: A. C. Watson, Denver, president; J. N. Chipley, Pueblo, first vice-president; Mary R. Bradner, Denver, second vice-president; Florence Green, Denver, corresponding secretary; L. S. Gilbert, Denver, recording secretary; Wm. Smedley, Denver, treasurer.

The next meeting will be held in Boulder, on the second Tuesday in July, 1900.

L. S. GILBERT, *Sec'y,*
401 Mack Bldg., Denver, Col.

CONNECTICUT STATE DENTAL ASSOCIATION.

FOLLOWING are the officers of the Connecticut State Dental Association, elected at the annual meeting held at Hartford, May 16 and 17, 1899: H. G. Provost, West Winsted, president; A. C. Fones, Bridgeport, vice-president; Edward Eberle, 68 Pratt street, Hartford, secretary; D. A. Jones, New Haven, treasurer. Executive Committee, P. A. Powers, Meriden; J. Tenney Barker, Wallingford; E. R. Whitford, Hartford.

The following committee was appointed to confer with Dr. E. Sauvez, secretary of the International Dental Congress at Paris: Drs. Jas. McManus, G. L. Parmele, Hartford; Civilion Fones, Bridgeport; E. S. Gaylord, New Haven.

The next annual meeting will be held at Hartford, on the third Tuesday and Wednesday in May, 1900.

EDWARD EBERLE, *Sec'y.*

IOWA STATE DENTAL SOCIETY.

THE annual meeting of the Iowa State Dental Society was held at Des Moines, May 2, 3, and 4, 1899. The officers elected for 1899-1900 were as follows: C. R. Baker, Davenport, president; C. Thomas, Des Moines, vice-president; I. C. Brownlie, Ames, secretary; W. R. Clack, Clear Lake, treasurer. T. L. James, Fairfield, was recommended to Governor Shaw for appointment to State Board of Dental Examiners. The next meeting will be held at Dubuque, on the first Tuesday in May, 1900.

I. C. BROWNLIE, *Secretary.*

GEORGIA STATE DENTAL SOCIETY.

THE Georgia State Dental Society held its thirty-first annual session at Sweetwater Park Hotel, Lithia Springs, Ga., June 13 to 16, 1899, and adjourned to meet the second Tuesday in June, 1900, at Cumberland Island, Ga. The following officers were elected for the ensuing year: M. N. Mexon, Rome, president; W. H. Weaver, La Grange, first vice-president; A. M. Jackson, Milledgeville, second vice-president; H. A. Lowrance, Athens, treasurer; S. H. McKee, Americus, recording secretary; O. H. McDonald, Atlanta, corresponding secretary; H. H. Johnson, Macon, journal editor. Executive Committee, B. H. Williams, Waycross; E. A. Tigner, Atlanta; C. P. Davis, Americus; W. A. Summerlin, Mt. Vernon; J. D. Reynolds, Marietta.

One of the most important actions of the society was the establishment of a dental journal, to be edited and published by the society and furnished the dentists of the state gratis. Another step toward the advancement of the profession was the election of a member to read a paper before the Georgia Teachers' Association on "Dental Hygiene" and the necessity of its being taught in public schools. Dr. W. H. Weaver, of La Grange, was elected to perform this duty. OTIS H. MCDONALD, *Cor. Sec'y.*

NORTHERN OHIO DENTAL ASSOCIATION.

FOLLOWING are the officers of the association for the ensuing year: L. L. Barber, Toledo, president; F. W. Knowlton, Akron, vice-president; W. T. Jackman, Cleveland, corresponding secretary; W. A. Siddall, Cleveland, recording secretary; D. A. Allen, Toledo, treasurer.

The next meeting will be held in Cleveland, in May, 1900.

OKLAHOMA DENTAL ASSOCIATION.

THE ninth annual meeting of the Oklahoma Dental Association was held in Oklahoma City, May 2, 1899. The meeting was a very successful one, there being fifteen applications for membership, and the attendance being the largest in the history of the association. Several valuable papers were read and discussed. The officers elected for the ensuing year are as follows: E. E. Kirkpatrick, Oklahoma City, president; T. F. Clifford, Elreno, vice-president; M. L. McConn, Shawnee, corresponding secretary; A. D. Gage, Stillwater, secretary and treasurer. Executive Committee, J. B. Gillespie, M. L. McConn, R. S. Parsons. Legislative Committee, W. E. Furrow, E. E. Kirkpatrick, T. F. Clifford.

The next meeting will be held in Oklahoma City, May 3, 1900.

A. D. GAGE, *Sec'y.*

LEBANON VALLEY DENTAL ASSOCIATION.

FOLLOWING are the officers elected at the annual meeting of the Lebanon Valley Dental Association, held at Harrisburg, Pa., May 16 and 17, 1899: Edw. P. Kremer, Lebanon, president; W. D. De Long, Reading, vice-president; H. J. Herbein, Pottsville, recording secretary; P. K. Filbert, Pottsville, corresponding secretary; C. B. Wagner, Pottsville, treasurer; P. K. Filbert, H. J. Herbein, M. E. Andrews, Executive Committee.

The next annual meeting will be held in Pottsville on May 15 and 16, 1900. H. J. HERBEIN, *Rec. Sec'y.*

HARRIS DENTAL ASSOCIATION.

THE thirty-second annual meeting of the Harris Dental Association was held in Lancaster, Pa., on Thursday, May 4, 1899.

The following officers were elected for the ensuing year: R. R. Underwood, Lancaster, president; B. Frank Witmer, Lancaster, vice-president; W. N. Amer, Lancaster, secretary; D. Rhine Hertz, Ephrata, treasurer; W. H. Lowell and H. A. Baer, Lancaster, and A. W. Rogers, Columbia, Executive Committee.

The association meets on the first Friday of each month, at 3 P.M. WM. N. AMER, *Sec'y.*

TEXAS DENTAL ASSOCIATION.

THE annual meeting of the Texas Dental Association was held in Waco, May 16, 1899. The following officers were elected for the ensuing year: J. W. David, Mexia, president; O. B. Love, San Antonio, first vice-president; H. L. Pearson, McKinney, second vice-president; J. G. Fife, Dallas, secretary and treasurer. Executive Committee, J. M. Nash, L. P. Robertson, Sam. G. Doff.

The society is in a healthy, growing condition, fifteen members having been added at the last meeting. The next meeting will be held in Dallas. J. G. FIFE, *Sec'y.*

CENTRAL DENTAL ASSOCIATION OF NORTHERN NEW JERSEY.

FOLLOWING are the officers for 1899: C. S. Hardy, Summit, president; H. S. Sutphen, Newark, vice-president; C. W. F. Holbrook, 2 Saybrooke Place, Newark, secretary; Charles A. Meeker, Newark, treasurer. Executive Committee, W. L. Fish, F. Edsall Riley, C. W. Hoblitzell, W. H. Pruden, Joseph S. Vinson.

C. W. F. HOLBROOK, *Sec'y.*

MASSACHUSETTS DENTAL SOCIETY.

THE annual meeting of the Massachusetts Dental Society was held in Boston, June 7 and 8, 1899. The officers elected were as follows: George A. Lowe, Rockport, president; John F. Dowsley,

Boston, first vice-president; Fred. S. Faxon, Brockton, second vice-president; Edgar O. Kinsman, Cambridge, secretary; Joseph T. Paul, Boston, treasurer; Thomas W. Clements, Brookline, librarian; Waldo E. Boardman, Boston, editor.

A committee was appointed to draft resolutions favoring the appointment of dentists to the army and navy of the United States, and present them to the next Congress.

An appropriation was made to aid in prosecuting illegal practitioners in the state, and a committee appointed to assist the state board in any action of the kind.

Dr. S. B. Palmer, of New York, was the especial guest of the society; Dr. E. A. Bogue, of New York, also was present. The papers, clinics, and exhibits were all highly interesting and instructive.

EDGAR O. KINSMAN, *Sec'y.*

SOUTH DAKOTA STATE DENTAL SOCIETY.

THE seventeenth annual meeting of the South Dakota State Dental Society was held in Yankton, June 7, 8, and 9, 1899. The subject of crown- and bridge-work was very ably presented in a paper and later demonstrated by Dr. Goslee, of Chicago.

The officers elected for the ensuing year are: W. O. Robinson, Parker, president; W. W. Price, Centerville, vice-president; C. L. Blunt, Yankton, secretary and treasurer; C. W. Stutenroth, Watertown, librarian. Lead was selected as the place for the next annual meeting, and the time for holding the same was left to the Executive Committee.

C. L. BLUNT, *Secretary.*

WASHINGTON STATE DENTAL SOCIETY.

THE twelfth annual session of the Washington State Dental Society was held in Seattle, commencing June 25, 1899. An interesting meeting was enjoyed by all who attended. The following officers were elected for ensuing year: M. D. Thurston, Spokane, president; E. J. Fisher, Tacoma, first vice-president; F. I. Shaw, Seattle, second vice-president; D. I. Burkhart, Seattle, secretary; J. E. Banks, North Yakima, treasurer. The meeting will be held in Spokane in 1900.

D. I. BURKHART, *Secretary.*

COLUMBUS DENTAL SOCIETY.

THE officers of this society are as follows: A. M. Harrison, president; F. R. Chapman, vice-president; Harry Cope, treasurer; C. A. Hawley, secretary.

The next meeting will be held in Columbus, Ohio, on the last Tuesday evening in September, 1899. The society is in a very prosperous condition, with constantly increasing membership.

C. A. HAWLEY, *Sec'y.*

NEBRASKA STATE DENTAL SOCIETY.

FOLLOWING are the officers of this society for 1899: W. A. Ivory, Wayne, president; W. H. Sherraden, Omaha, vice-president; A. B. Clark, Seward, recording secretary; Leah Mills, Omaha, corresponding secretary.

The next meeting will be held at Omaha, on the third Tuesday in May, 1900.

PORT HURON DENTAL ASSOCIATION.

THIS association is in the second year of its existence, and is in a flourishing condition. Monthly meetings are held, and much interest is manifested. The officers for the current year are as follows: M. B. Dennis, president; A. N. Hart, vice-president; George Webster, secretary; W. O. Randall, treasurer.

GEO. WEBSTER, *Secretary,*
Port Huron, Mich.

INDIANA STATE DENTAL ASSOCIATION.

THE following officers were elected at the annual meeting of this association, held at Fort Wayne, June 27, 1899: M. A. Mason, Fort Wayne, president; G. E. Hunt, Indianapolis, vice-president; W. W. Mungen, Fort Wayne, treasurer; F. R. Henshaw, Middletown, secretary.

The next meeting will be held in Indianapolis, June 26, 1900.

J. S. MCCURDY.

MISSOURI STATE DENTAL ASSOCIATION.

THE Missouri State Dental Association, at its thirty-fifth annual meeting, held at Kansas City, Mo., July 11-14, 1899, elected the following officers for the coming year: W. L. Reed, Mexico, president; S. J. Smith, Columbia, first vice-president; A. M. Tutt, Liberty, second vice-president; B. L. Thorpe, St. Louis, corresponding secretary; H. H. Sullivan, Kansas City, recording secretary; J. A. Price, Savannah, treasurer.

The next meeting will be held in Louisiana, Mo., on the first Tuesday after July 4, 1900. B. L. THORPE, *Cor. Sec'y.*

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DENTAL COLLEGE COMMENCEMENTS.

NEW YORK COLLEGE OF DENTISTRY.

THE thirty-third annual commencement exercises of the New York College of Dentistry were held in Chickering Hall, New York city, on Monday evening, May 15, 1899.

The address to the graduates was delivered by Rev. Percy S. Grant, D.D., and the valedictory by Maurice Green, D.D.S.

The degree of D.D.S. was conferred on the following graduates by Rev. George Alexander, D.D., president of the board of trustees:

Austin C. Bamford.
Alex. M. Birkhahn.
Harry Bowman.
Bernard Braverman.
John M. Breen.
Egbert W. Brown.
Arthur S. DeVoe.
John P. Donlevy.
Walter G. Douglas.
Max L. Eichhorn.
Clarence D. Foster.
Maurice Green.
Harry J. Gibbins.
John R. Hasbrouck.
Frank W. Holms.
Clarence O. S. Howe.
Chas. G. Hubbell.
Wm. W. Irving.
John P. Koch.
Joseph M. Levy.
Jean B. Leprohon.
Carl C. Limbarth.
L. Loogendyke.
Edw. F. McGuirk.
Alfred D. Payne.
Robert H. Pentz.
George W. Putnam.
Richard D. Quaile.
Chas. F. Rabell.
Anthony F. Rebholz.
Walter C. Riggs.
J. H. Saghirian, A.B.
Robert Strobridge.
Charles Urban.
Ray G. Vaughan.
Wm. P. Vogel.
Chas. A. Van Orden.
Ransford B. Van Giesor
Arno W. Walther.
Thomas M. Weed.
Simon Zuchtmann.

MARION-SIMS COLLEGE OF MEDICINE, DENTAL DEPARTMENT.

THE annual commencement exercises of the Dental Department of Marion-Sims Medical College were held in the Fourteenth Street Theater, St. Louis, Mo., on Wednesday evening, April 19, 1899.

The doctorate address was delivered by Dr. H. N. Moyer.

The degree of D.D.S. was conferred on the following graduates by Young H. Bond, A.M., M.D., dean of the college:

Joseph M. Bobbitt	Missouri.
Lewis A. Chamberlin	Missouri.
Leander O. Crall	Illinois.
Otto F. H. Depperman	Indiana.
Amos Ditty	Illinois.
Arthur C. Edmonds	South Africa.
Gustavus J. Ellwanger	Missouri.
Jonathan H. Gallemore	Missouri.
Oscar Hammer	Missouri.
Alvin N. Martin	Tennessee.
Leo G. McKellops	Missouri.
David E. Morrow	Missouri.
Elmer L. Page	Missouri.
Augustus R. Parrish	Missouri.
Benj. L. Renfrow	Illinois.
Harvey B. Scarsdale	Illinois.
Jos. F. Schiermann	Illinois.
John A. H. Schwind	Illinois.
Robert L. Shanklin	Illinois.
Joseph J. Simmons	Mississippi.
Wm. W. Von Wormer	Illinois.
Richard E. Vernon	Illinois.
Edmund L. Watson	Arkansas.
William A. Weis	Missouri.
Fielden W. Wiseman	Missouri.
Joseph H. Witfield	Missouri.

WESTERN RESERVE UNIVERSITY, DENTAL DEPARTMENT.

THE commencement exercises of Western Reserve University Dental College were held June 15, 1899, in Beckwith Memorial Church, Cleveland, Ohio.

President Chas. Gilmer, of Johns Hopkins University, delivered a suitable address.

President Chas. F. Thwing, D.D., LL.D., conferred the degree of D.D.S. upon the following graduates:

Ross W. Andrews.
Arthur D. Apple.
Almon L. Atwater.
Liscomb D. Auxter.
Homer A. Baldwin.
Varney E. Barnes.
George Bridgeman.
William E. Costello.
Harry P. Eaby.
Leigh L. Finch.
Samuel T. Gilmore.
Emanuel Grossman.
Frank J. Gunn.
Jay C. Kelley.
John Mistr.
Chas. C. Mottinger.
Jay K. Nash.
Edward L. Norton.
Frank L. Olds.
James A. Rupert.
Frank W. Stevenson.
Cameron R. Stewart.
Charles E. Taylor.
Oscar J. Van Dorston.
Samuel M. Weaver.
John B. Webber.
Charles N. White.
Douglas A. Wright.
Dan H. Ziegler.

UNIVERSITY OF MICHIGAN, COLLEGE OF DENTAL SURGERY.

The fifty-fifth annual commencement exercises of the University of Michigan were held in University Hall, Ann Arbor, Mich., on Thursday, June 22, 1899.

The number of matriculates for the session was two hundred and thirty-five.

The commencement oration was delivered by Nicholas M. Butler, LL.D.

The degree of D.D.S. was conferred on the following graduates of the College of Dental Surgery by President J. B. Angell:

Hilen D. Aldrich.
Wm. J. Allan.
Arthur A. Baker.
Victor E. Bedford.
Helmuth P. Binzel.
Francis L. Busch.
Will C. Butler.
Jos. McG. Cartwright.
Frank P. Cattermole.
Carroll F. Chase.
Gilbert A. Cotton.
Loran S. Fleming.
Geo. M. Freeman.
John E. Gilbert.
Henry W. Harvey.
Claude E. Hathaway.
Perry F. Hines.
Stanley A. Horning.
Richard J. Huyck.
Carl A. L. Johnson.
Herbert C. King.
Wilfred D. Kirk.
Jay W. Kline.
William G. Law.
Jesse Levy.
Chas. L. McKinnis.
David C. Martin.
Sidney Martin.
George H. Mengel.
Clair G. Meseroll.
Charles J. Miller.
John Miller.
Edgar E. Nelson.
Fred C. Orvis.
Harry C. Orvis.
Charles M. Owen.
Sidney D. Peters.
Wm. J. Polglase.
Francis E. Renkenberger.
Ray D. Robinson.
Erwin A. Salisbury.
Earl W. Sanford.
Edmund H. Shannon.
Harry W. Sheldon.
John F. Sortore.
Flora M. Spore.
Rene M. Squier.
Clifford F. Stipp.
H. A. Stites, A.M.
Philip R. Thomas.
A. C. Thompson.
Loren S. Treat.
Edw. N. Trenholme.
Fred M. Washburn.
Benj. W. Wells.
Chauncey C. Wescott.
Frank D. Wilson.
Charles A. Wise.
Alvin O. Wright.

UNIVERSITY OF IOWA, DENTAL DEPARTMENT.

The annual commencement exercises of the Dental Department of the University of Iowa were held in the opera house, Iowa City, Ia., on Monday, June 5, 1899, at 10 o'clock A.M.

An address was delivered by Hon. Milton Remley, attorney-general of Iowa.

The degree of D.D.S. was conferred on the following graduates by Amos N. Currier, A.M., LL.D., acting president of the university:

Leroy C. Albright	Iowa.
John B. Baumer	Iowa.
John J. Booth	Iowa.
Guy R. Bruce	Iowa.
Charles C. Countryman	Iowa.
John C. Davis	Iowa.
John M. Davis	Illinois.
Herbert H. Gardner	Iowa.
Lewis B. Gray	Iowa.
Edmund M. Hogan	Iowa.
Thomas F. Hannafin	Iowa.
Oliver Johnson	Iowa.
Clark C. Keeler	Iowa.
Orange R. Kelley	Iowa.
John E. Long	Iowa.
William D. Lowry	Iowa.
William H. Lawrence	Iowa.
Loveless E. McGarvey	Iowa.
Charles J. Mentzer	Iowa.
Robert E. Morriss	Missouri.
William S. Oyler	Iowa.
Robert R. Page	Iowa.
Clarence L. Penney	Iowa.
Charles H. Pray	Iowa.
Samuel J. K. Seydel	Iowa.
Fred N. Stute	Minnesota.
Gerald F. Tullis	Iowa.
Raymond T. Warner	Iowa.
Harry D. Willey	Iowa.
Ray O. Williams	Iowa.
James D. Welsh	Iowa.
Lillian M. Young	Iowa.

UNIVERSITY OF MINNESOTA, COLLEGE OF DENTISTRY.

The twenty-seventh annual commencement exercises of the University of Minnesota were held in the Armory Building, Minneapolis, Minn., on Thursday, June 1, 1899.

The degree of D.M.D. was conferred on the following graduates of the College of Dentistry by Cyrus Northrop, LL.D., president of the university:

John E. Argue	N. Dakota.
Clarence D. Benton	Minnesota.
Alexander S. Campbell	Minnesota.
Charles P. Foote	Minnesota.
Ray H. Gallagher	Kansas.
Edward Gorgen	Minnesota.
Edwin A. Hagaman	Minnesota.
George E. Hall	Canada.
Hugh H. Henderson	Minnesota.
Eugene F. Hertz	Minnesota.
John Jeffers, Jr.	Minnesota.
James L. Kelly	Minnesota.
Nelson M. King	Minnesota.
Elton H. Phelps	Minnesota.
Gilbert F. Stone	Minnesota.
Robert P. Updyke	Minnesota.
James O. Wells	South Carolina.
Sanford E. Whitmore	Minnesota.

DETROIT COLLEGE OF MEDICINE, DEPARTMENT OF DENTAL SURGERY.

The annual commencement exercises of the Dental Department of the Detroit College of Medicine were held in the opera house, Detroit, Mich., on Thursday evening, June 15, 1899.

Addresses were delivered by Dr. J. B. Book, Dr. George S. Shattuck, and Dr. James Samson, of Windsor, and the valedictory by George B. Kummer, D.D.S.

The degree of D.D.S. was conferred on the following graduates by Hon. Sidney D. Miller, president of the college:

J. F. Boles	Ontario.
S. M. Burnstine	Michigan.
F. B. Carruthers	Ontario.
A. S. Diack	Michigan.
E. J. Duffy	Ontario.
C. P. Daiber	Michigan.
J. T. Degel	Michigan.
O. S. Groff	Ontario.
W. H. Graham	Ontario.
R. F. Golden	Ontario.
E. C. Hay	Ontario.
C. F. Keho	Michigan.
G. B. Kummer	Michigan.
H. L. Large	Ontario.
A. W. Marcus	Ontario.
F. W. MacDonald	Michigan.
F. W. Robinson	Michigan.
W. Randolph	Michigan.
W. P. Stafford	Michigan.
G. I. Schoellig	Ontario.
C. W. Trestain	Ontario.
P. J. Taylor	Michigan.

NATIONAL UNIVERSITY, DENTAL DEPARTMENT.

The fifteenth annual commencement exercises of the Dental Department of National University were held in the National Theater, Washington, D. C., on Tuesday evening, June 6, 1899.

The address to the graduating class was delivered by Professor Millard F. Thompson, D.D.S., M.D., and the valedictory by J. Kell Munroe, D.D.S.

The degree of D.D.S. was conferred on the following graduates by Hon. Richard H. Alvey, LL.D., chancellor of the university:

James R. Armstrong	New York.
Thomas F. Baxter	Connecticut.
Charles P. Cullen	Georgia.
John P. Devlin	New York.
Zachariah E. House	Maryland.
M. Francis Kirwan	New York.
John K. Munroe	Georgia.
J. Beverly North	Canada.
William B. Todd	West Virginia.
Lilburn E. Ward	Virginia.

ROYAL COLLEGE OF DENTAL SURGEONS OF ONTARIO.

At the recent meeting of the Board of Directors of the Royal College of Dental Surgeons of Ontario, the following were admitted to practice dentistry in Ontario and given the degree of Licentiate of Dental Surgery:

E. C. Abbott.
J. W. Armstrong.
F. A. Ballachey.
P. P. Ballachey.
L. A. Barrett.
W. T. Bell.
M. Bowles.
W. H. Bowles.
C. Brown.
A. C. Caldwell.
A. G. Campbell.
T. F. Campbell.
J. M. Church.
C. H. R. Clark.
H. A. Clark.
R. H. Cowen.
H. O. Crane.
T. A. Currie.
W. N. Cuthbert.
J. C. Devitt.
E. M. Doyle.
J. C. R. Fitzgerald.
L. L. Follick.
G. Frizzell.
G. Gow.
S. B. Gray.
G. W. Grieve.
W. T. Hackett.
J. J. Hart.
E. H. Henderson.
H. G. Hoare.
G. E. Holmes.
G. W. Humpidge.
N. H. Hunter.
A. E. Joselin.
C. A. Kennedy.
H. J. Kennedy.
F. B. Kenward.
W. J. W. Laker.
R. Lederman.
W. W. Lemmon.
C. C. Lumley.
J. I. McMillan.
G. T. Marrs.
N. Millar.
A. Milburn.
D. M. Mitchell.
A. T. Morrow.
R. J. Morton.
E. C. Murray.
F. W. Murray.
J. F. O'Flynn.
G. L. Palmer.
T. F. Perkin.
C. M. Reeves.
L. F. Riggs.
A. R. Robertson.
D. D. Ross.
R. R. Ross.
W. J. Schmidt.
J. C. Shields.
M. O. Sipes.
A. A. Smith.
S. M. Snedden.
C. A. Snell.
J. S. Somers.
R. A. Sykes.
G. D. Van Arman.
L. C. Wadsworth.
F. R. Watson.
W. T. Willard.
P. P. Winn.
A. W. Winnett.
J. C. Wray.
E. I. Zinkan.

All of the province of Ontario.

COLUMBIAN UNIVERSITY, DENTAL DEPARTMENT.

The annual commencement exercises of the Dental Department of Columbian University were held in Convention Hall, Washington, D. C., on Wednesday evening, May 31, 1899.

The number of matriculates for the session was sixty-six.

The degree of D.D.S. was conferred on the following graduates by President B. L. Whitman:

Arthur R. Bennett	Georgia.	William E. Pairo	Virginia.
Enrique Cuevas	Chile.	Stephen D. Pool	Louisiana.
William C. Fisher	Dist. of Col.	William A. Rawson	Michigan.
Thomas J. Gates	Maryland.	Thomas M. Rice	Pennsylvania.
Walter B. Hoofnagle	Maryland.	Harry S. Terry	Michigan.
William M. Kemball	Dist. of Col.	William G. Woodford	Dist. of Col.
John R. McChesney	Maryland.		

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DENTAL SOCIETY ANNOUNCEMENTS.

NEW BRUNSWICK DENTAL SOCIETY.

The tenth annual meeting of the New Brunswick Dental Society will be held at St. Stephen, N. B., August 24, 1899. A cordial invitation is extended to members of the profession. Reduced railroad rates.

C. F. Gorham, *Secretary-Treasurer.*

EDITORIAL.

PYORRHEA ALVEOLARIS.

It may perhaps be safely said that the literature of so-called pyorrhea alveolaris reflects the evolution of dental pathology from a state of almost pure empiricism toward a more or less exact scientific basis. In the earlier history of the subject it was universally regarded as a purely local disorder; that is, as having both its origin and expression wholly in the retentive structures of the teeth, and, further, because of the frequent association of calculary deposits with certain forms of the disorder, these were generally regarded as the primary cause of the lesion. Indeed, the causal relation between calculary deposits and this disease is still maintained by many as its principal source.

It is generally admitted that no more complex problem has confronted the dental pathologist, and no other has called forth so many and diverse opinions. These two facts are in themselves highly significant, as indicating the probability that what was originally regarded as a single disease, or in its various manifestations but so many modifications of a single disease, is in reality a complexus of conditions having different etiological relationships as well as diverse clinical expressions.

The many-sided character of the problem has even to careful and competent observers shown so many facets of truth that a multitude of theories and therapeutic suggestions have been promulgated, none of which have satisfactorily met the whole issue; yet because many contained a modicum of truth they could not be safely cast aside.

The state of affairs as noted seems to be inseparable from progress in any department of human inquiry. Knowledge is not acquired by leaps and bounds, but by slow steps and much care and labor. The empirical method of study of pyorrhea alveolaris was a necessary phase of its earlier investigation. The principles of pathology which are the basis of all study of disease had not been worked out with anything like clearness. We had no adequate conception of the intimate nature of inflammatory processes in general, and the varying reactions of the vital processes of the cell to irritative environing conditions were not understood.

Studies which would clarify our knowledge of the physics and chemistry of protoplasm were necessary before the way could be opened for a scientific interpretation of the morbid processes arbitrarily included in the designation pyorrhea alveolaris.

It may be argued that a profound study of the subject is without use to the practical operator; that the disease is or is not incurable, as the case may be, and that one practical method of treatment is worth a dozen theories as to the cause of the disorder. The history of this, as of other problems, shows that their practical solution is in direct proportion to their intelligent understanding, a fact exemplified in general pathology to an extent which no longer admits of controversy. So that we may hope and believe that as scientific research adds to our knowledge of the etiology of pyorrhea alveolaris, so shall we be able to successfully treat it.

The controversies which have waged about the question of its local or its constitutional origin are also a necessary and significant expression of the transitional period through which our concept of the problem is passing. Like many similar problems upon which two partial truths are brought to bear as evidence, it is probable that when the whole story is told both sides will be included because of the truth that each contains.

We notice elsewhere in these pages the work of Dr. Talbot, which is the most recent and in many respects the most valuable contribution yet made to the literature of the subject. It is a book that needed to be written, and it has been well done. It needed to be written because the time is fully ripe for a work which will in some degree harmonize the many apparently conflicting views on the subject by bringing into line all of the truth they contain and put them into such form and order that a fair generalization may be deduced therefrom.

This the book fairly does. It does not tell the whole story, for the simple reason that all the data bearing upon the disorder have not as yet been brought to light; but order has been brought out of much of the chaos of empiricism which has heretofore beclouded the subject, and much additional information, the result of original research, has been added to our knowledge of it.

The most important feature of the work is the evidence which it contains of the fact that the disease has a constitutional relationship as well as a local expression,—a fact pregnant with meaning in reference to its bearings upon dental and oral therapeutics. In short, it indicates that the general principles of pathology, of physiology, of therapeutics, and of the practice of medicine must form a prominent part of the educational equipment of that class of dental practitioners who desire to be something more than mechanics, and who must be if dentistry as a profession is to be something more than an empty phrase.

THE BOSTON DENTAL COLLEGE.

On Saturday, July 1, 1899, the Boston Dental College became the dental department of Tufts College.

When the laws of Massachusetts made it impossible for any but medical schools to receive subjects for dissection, and since dissection is one of the studies absolutely required by the National Association of Dental Faculties, it became a matter of very serious consideration to the trustees of the dental college whether it would not be for the best interests of its students to annex the college to a university or college having a medical department. The matter has been seriously considered for several years; Tufts College was the final selection. An act of the legislature was passed giving the right to a union of the two colleges. The state law in regard to dissection made this action imperative.

For the present the college will retain its name. All of the dental lectures will be given in the old building, and the medical lectures will be given in the Tufts Medical School. A new building for the dental department is to be built on land near the Tufts Medical School in the near future.

DR. ALTON HOWARD THOMPSON.

We learn with pleasure that Dr. A. H. Thompson, of Topeka, Kansas, well and favorably known to our readers as a contributor to the Dental Cosmos, has been elected to the chair of Dental Pathology and Therapeutics in the Philadelphia Dental College, made vacant by the resignation, on account of ill health, of Dr. Henry H. Burchard, who is at present recuperating in California.

Dr. Thompson will come East to enter upon his duties early in September.

BIBLIOGRAPHICAL.

Chemistry and Metallurgy Applied to Dentistry. By Vernon J. Hall, Ph.D., Professor of Chemistry and Director of the Chemical Laboratories in the Dental School and in the Woman's Medical School of Northwestern University. The Technical Press, Evanston, Ill. Price, cloth, $2.00.

This little work is an admirable attempt to relate the facts and principles of chemistry and metallurgy to dental art and science, and render them available for the use of dental students.

On the whole the attempt may be regarded as successful as far as it goes. Much valuable information is to be found in the book, though as a statement of facts it is not above criticism. For example, the author says, page 8, "Potassium and sodium are plastic." But so are many other metals; plastic is purely a relative term in this connection, and its relativity to conditions of stress should have been noted.

No reason is given for the statement that arsenic is present in shot to the extent of one-half per cent., when it should have been explained that arsenic in the amount noted gives increased hardness and sphericity to the shot.

The student is directed to use "stannite" as a reagent, told how to prepare it, but is not told what it is or what is the character of its chemical action as a reagent.

The action upon tooth-structure of cadmium as a constituent of dental amalgams is not fully stated, nor its tendency to stain pulpless teeth by formation of cadmium sulfid noted.

The directions for making chlorin water, page 41, are misleading, as under the circumstances free chlorin and chlorin peroxid are formed.

No suggestion of the chemical nature of smalt, page 45, is given in the reference to the substance.

Under "Barium" it is stated of the metal that it is "silver-white, ductile, and malleable," and this is immediately followed by the statement that the metal "has never been obtained in the coherent state."

Of sodium, page 51, it is said that it must be kept under oil, and omission is made of the important fact that a hydrocarbon oil is essential to the safe keeping of this metal.

The further statement, "Sodium compounds color the flame a bright yellow, intercepted by blue glass," is misleading phraseology.

At page 94 we find "the tenacity of iron compared with that of steel is in the ratio of one to two and a half." But we may ask what kind or quality of steel is here referred to?

These are a class of imperfections in the work which should be corrected, both from a scientific and pedagogical point of view.

The author's study of the occurrence of arsenic in dental cements is most interesting and important; he says, "It is generally recognized that oxyphosphate cement is more or less irritating when placed in proximity to the pulp. A suggestion of the possible cause of this action is found in the fact that cement powders contain more or less arsenious oxid. The reason for this is that zinc and arsenic are often closely associated in nature, and when zinc oxid is prepared for a cement powder the treatment often fails to remove all the arsenic. Out of fifteen prominent cements analyzed by the author but two were found to contain only traces, while the remainder contained from 0.04 to 0.1 per cent. of arsenious oxid."

Taken for what it is, a book for dentists written by a chemist, it is admirable in its arrangement and valuable as a text-book, with the exception of a few inaccuracies as noted. It needs amplification on the strictly dental phases of the subject, which only a closer familiarity with dentistry and dental needs can supply.

INTERSTITIAL GINGIVITIS, OR SO-CALLED PYORRHŒA ALVEOLARIS. By EUGENE S. TALBOT, M.D., D.D.S. Large octavo, 192 pages. With seventy-three illustrations. Philadelphia, The S. S. White Dental Mfg. Co., 1899. Price, cloth, $3.50 net.

This work by Dr. Talbot is of all his writings the one which will perhaps excite the most interest and criticism among dental practitioners. It represents a large and painstaking labor, which is presented in most attractive and readable form.

A full history of the literature and theories advanced as to the cause of the disorder forms the introductory part of the work. The structures involved are next studied anatomically, histologically, and biologically. After which the author's own studies, both clinically and in the laboratory, are given, and are supplemented by the work of several colleagues associated with him in special research work upon different branches of the subject.

To uric acid and the uric acid diathesis the author accords but a minor *rôle* in the production of the inflammatory process under consideration. Summing up that part of the subject, he says, "Uric acid acts, when at all, solely as a local irritant," which nobody ever questioned. The manner of its local action as an irritant is capable of further elucidation, and is of importance, since one infers from Dr. Talbot's exposition of this phase of the question that he regards the local irritant action attributed to uric acid as a type of mechanical irritation analogous to that caused by calculary deposits, whereas the contention of those holding to a belief in the uric acid theory of pyorrhea is that it acts as a toxic chemical irritant to the cellular protoplasm through the blood plasma, causing cell death or molecular necrosis of the peridental membrane, and that uratic deposits upon the cementum are subsequent and not precedent to the necrotic process. At page 21 of the work is a republication of the author's statement, as follows:

"Standing on the corner of Piccadilly Circus and Regent street, London, in the fall of 1897, I examined the faces of ten thousand passers by, and found that eighty-three per cent. possessed jaws inside the perpendicular line."

To the uninitiated in the technique of anthropological research the attainment of the foregoing result under the circumstances noted savors of the miraculous, or at least of the extraordinary employment of that mental function described and advocated by Tyndall as the scientific use of the imagination. Allowing one minute for each observation of facial angle and recording of the result, about one hundred and sixty-seven hours must have been consumed, which would require thirty-three days of five hours each, or, allowing but two hours per day for the work, would have carried the investigation over three months and pretty well into the winter season. It would be of general interest to know the exact method by which this important result was obtained.

The greatest interest will center in the author's exhibit of his own studies of the inflammatory changes through which the affected tissues pass from the initial stages of the disease until the exfoliation of the tooth through necrosis of its retentive apparatus. This section of the work will bear minute study, and while at a few points exception may be taken, the general result is admirable and one for which unstinted praise should be given. How one can rise from a careful study of this part of the work with any lingering doubt as to the importance of the constitutional factor in the disorder is inexplicable, for there is furnished all the evidence one could desire of the fact that we are confronted with a reaction manifested between a tissue and an irritant substance or environment, an irritant arising from within the tissue or external to the tissue, and the result of tissue resistance in this, as in all cases, determines the result of the disease.

The explanation given of the epithelial structures first described by Black as glands of the peridental membrane is a plausible and interesting one. The importance of these bodies as related to the disease grows mainly out of the assertion of Black that they are the seat of phagedenic pericementitis. Talbot believes them to be residual elements of the epithelial structure described by O. Hertwig, and known as Hertwig's epithelial sheath. A study of specimens gives much ground for a belief in this explanation of their origin. Their pathological significance and their function are, however, questions which are as yet obscure. Whether they are deteriorated evolutional products or are of special functional value is as yet undetermined.

In his pathological study the author apparently magnifies as predisposing causes conditions of jaw evolution, transitory nature of certain structures, degeneracy, and conditions of previous irritation and inflammation, and gives a minor importance to malnutrition and faulty metabolism of foods, which latter we believe to be more generally responsible as predisposing factors than those due to abnormal condition of the tissues, congenital or evolutionary.

The author has offered no essentially new suggestions as to treatment, but reiterates his own methods, with which the profession is already familiar.

The value of the book lies in its broad scientific treatment of a subject which has not as yet been presented from the standpoint of careful scientific observation and research.

While exceptions may be taken to many of its features and conclusions, we know of no other single work in which so satisfactory and trustworthy a picture of this widely prevalent disorder may be obtained.

OBITUARY.

DR. J. T. ABBOTT.

Dr. Jared T. Abbott died at his home, Manchester, Iowa, June 28, 1899, of general decline, incident to old age.

Dr. Abbott was born in Homer, Cortland county, N. Y., January 2, 1824, and was consequently in his seventy-sixth year at the time of his death. After being graduated from Cortland Academy he engaged in various pursuits, but finally settled upon dentistry as his life-work. He began practice in Cumberland, Md., but in 1861 removed to Fabius, N. Y. In 1864 he entered the Union army, 185th New York Volunteer Infantry, remaining to the close of the war, when he was mustered out as brevet major. He resumed the practice of dentistry, this time in New York city. In 1868 Dr. Abbott removed to Manchester, Iowa, where he remained continuously in practice to the time of his death. His sterling qualities as a man and his ability as a practitioner made him prominent in his profession, in every movement for the upbuilding of which he bore the part of a faithful worker. He was a member of the State Dental Association for many years, its president in the year 1873-74; a member of the State Board of Dental Examiners, its president at the time of his death, and for a long time previous; he represented the State Board in the National Association of Dental Examiners, of which body he served as president two terms; he was a member also of the American Dental Association and of its successor, the National Dental Association.

Dr. Abbott was prominent in Masonic circles; was past grand master of the Grand Lodge of Odd Fellows of Iowa; brigadier-general of the Patriarchs Militant. He served three years as mayor of Manchester, giving the town a progressive and business-like administration.

The funeral is spoken of by one of the local newspapers as perhaps the most imposing ever witnessed in the town. More than a thousand people followed the remains to the grave, among whom mingling with the sorrowing townsmen were many men of note from all over the state, representing organizations with which the deceased was connected. "The elaborateness of these services, the last which loving hands could do for one held dear in life, were but significant of the strength of that regard which the warm-hearted, amiable, unselfish personality of Dr. Abbott inspired."

Dr. Abbott was one of the most genial, companionable of men. We cannot better describe his character than by reproducing the words of one of his friends and neighbors: "He was an honest man,—honest in business matters, honest in his friendships, honest in his beliefs; the friends who will hold him in most affectionate memory are those by whom his qualities of heart and mind are best known and most gladly recalled. A man of warm impulses, large heart and brain, charitable almost to a fault, if such a thing could be, of scholarly and refined tastes, unwavering in his friendships, such was Dr. Abbott. . . . . To this community his death is a great sorrow."

Another, in a brief letter to the writer announcing the death of Dr. Abbott, says, "He was one of the best men in all senses: a gentleman, a kindly friend, an earnest and faithful teacher; a man of noble character, to whom young and old looked as an example of all that was best in the professional world. His loss will be felt beyond his town and his state."

Dr. Abbott was married, in 1850, to Miss Frances Parmalee, who, with their two sons, survives him. To them we tender our sincere sympathy. It does not lessen the sting of parting to know that his noble character inspired universal love and good-will, but it will be a comforting thought that the memories of his good deeds, his unselfish labors for the good of his fellows, will live with many who were the recipients of his kindly and helpful counsels.

F. L. H.

DR. ALBERT H. ELLSWORTH.

Dr. Albert Hayden Ellsworth died at his home in Green Bay, Wis., February 5, 1899, from heart-failure, in his seventy-seventh year.

He was born in Windsor, Conn., and after receiving a public school education took up the study of dentistry, and in 1848 began, in Milwaukee, Wis., his professional career. In a very few years he had acquired a wide reputation as a dentist, and built up a flourishing practice, and at the same time he had won the highest esteem socially. He was an active worker in the Plymouth Congregational Church, and was a member of the I. O. O. F., Menominee Lodge.

At a time when the prospect seemed brightest for a long and brilliant career in the community in which he had made his home, Dr. Ellsworth found his health giving way, and so rapidly did he fail in strength that his recovery was despaired of by his physicians. Under these circumstances he removed, in 1852, to Green Bay, to spend the last months of his life,—as it was supposed. A totally different fate, however, awaited him. He began to recover strength, and before long his health was completely re-established. Remaining in Green Bay, he entered anew upon professional work, in which his skill and experience met their reward in a repetition of the success he had formerly achieved, while his force of character and integrity again gave him great influence among his fellow-citizens. A warm friend of education, he efficiently filled for fourteen years the position of city superintendent of schools.

After over forty years of useful living at Green Bay he found his health failing,—this time not to be recovered,—and for four years prior to his death he was an invalid. Forced relinquishment of active duty was a great trial to him, yet he bore it with much patience.

In the removal of Dr. Ellsworth, his children are called to mourn a father tenderly loved, and his community a steadfast worker in the public interest, while the dental profession loses one of those skillful and honest practitioners who are its pride.

DR. AARON M. AUSTIN.

DIED, June 2, 1899, at his home, Rockland, Me., Dr. AARON M. AUSTIN, from heart-failure induced by overwork.

Dr. Austin was born at Thomaston, Me., April 26, 1840. His dental pupilage began in 1858, at Terre Haute, Ind., under Dr. Lincoln. He served in 1861 with his regiment (11th Indiana Infantry) in West Virginia. Here he contracted rheumatism, and was discharged. He subsequently practiced dentistry in Terre Haute, later in Cairo, Ill., and afterward in St. Louis, Mo.; but in 1873, on account of his rheumatic trouble, he returned to New England, and settled at Rockland, making it his home for the remainder of his life.

Dr. Austin was a member of the Maine State Dental Association, and ranked high in his profession. His ability and industry built up an excellent practice, in which his brother, Dr. Maynard S. Austin, became his associate. He found time nevertheless for a highly useful activity in civic interests. The full representation of Rockland's business men formed a notable feature of the large assemblage at the funeral services, held June 5, and testified to the affectionate esteem in which his open-hearted, generous character and good citizenship in private and in official life caused him to be held by the community in which for the last quarter of a century he was so prominent a figure, and in which he will be greatly missed.

He married, October 3, 1865, at Terre Haute, Augusta M. Ford, who with a daughter, Mrs. E. Clyde Thomas, survives him.

DR. DANIEL G. HARRINGTON.

DANIEL G. HARRINGTON, D.M.D., died June 13, 1899, at his home, Newton, Mass., from gastric derangement.

Born in Westboro, Mass., May 19, 1832, his education was received in the public schools of that place, and later at the Kimball Union Academy of Meriden, N. H., from which he was graduated in 1855. A few years later he settled in Boston, and entered upon the practice of dentistry. His name appears among the graduates from the Harvard Dental College in the class of 1870. For the last twenty-six years his home had been in Newton.

Dr. Harrington was a member, and for a time vice-president, of the Massachusetts Dental Society; he was also one of the original members of the Boston Dental Improvement Society.

He leaves a widow, formerly Miss Caroline Payson, of Holliston, to whom he was married in 1858.

A member of the Eliot Congregational Church, the doctor will be much missed as one who took a lively interest in church and Sunday-school work. Rev. W. H. Davis conducted the funeral services, June 15, and the remains were then taken to Westboro for interment.

DR. EDWARD G. PRICE.

DR. EDWARD G. PRICE, of Utica, N. Y., died in New York city April 10, 1899, of pneumonia.

Born in Utica about twenty-five years ago, this promising young dentist was much esteemed in that community for his manly qualities, and his untimely removal is much deplored. He studied dentistry under Dr. A. H. Lee, of Utica, and afterward became a student in the Baltimore Dental College, from which he was graduated March 31, 1899. His mother and a sister survive him.

DR. FREEMAN BRADY.

DR. FREEMAN BRADY died at his home, Mill Hill, Pa., April 1, 1899, from dropsy, in his sixty-sixth year.

Dr. Brady, nearly all of whose life was spent in Mill Hill, though he was born in Liberty, Tioga county, Pa., was a man whose good citizenship won the high regard of his neighbors. He had served as postmaster and also as overseer of the poor. He was a faithful member of the Disciples denomination.

He is survived by his wife, two sons (Dr. H. E. Brady, of Lock Haven, and Dr. James Brady, of Erie), and a daughter, Mary; also by his two adopted daughters, Mrs. John Carstetter, of Abdera, and Mrs. Wm. Hutchinson, of Harrisburg.

DENTAL LEGISLATION.

DENTAL LAW OF INDIANA.

FOLLOWING is the new dental law of Indiana, approved by the Governor March 6, 1899:

A BILL for an Act to regulate the practice of Dentistry, providing for the issuing of licenses to practice, providing for the appointment of a Board of Dental Examiners and defining their duties, defining certain misdemeanors and providing penalties, and repealing all laws in conflict therewith.

SECTION 1. Be it enacted by the General Assembly of the State of Indiana, That it shall hereafter be unlawful for any person to practice dentistry in Indiana who has not first obtained a license so to do, as hereinafter provided.

SEC. 2. A Board of Examiners consisting of five reputable practicing dentists shall be appointed on or before the last Tuesday of June, 1899, and biennially thereafter, one by the Governor, one by the State Board of Health, and three by the Indiana State Dental Association, said board to serve for the term of two years from the date of such appointment. When convened said board shall examine all applications, issue certificates thereon, and also may examine all applicants for certificates of qualification and issue such certificates to all such applicants as shall pass a satisfactory examination.

SEC. 3. The State Board of Dental Examiners now in existence shall continue as now constituted until said board shall have been reorganized, as provided in Section 2 of this act.

SEC. 4. After this law goes into effect any person desiring to begin the practice of dentistry shall procure from the State Board of Dental Examiners a certificate that such person is entitled to practice dentistry in the state of Indiana, and in order to procure such certificate the applicant shall submit to the State Board of Dental Examiners his diploma, with an affidavit setting forth the time and under what circumstances said diploma was received, and that the affiant is the person to whom such diploma was issued. Such application shall be accompanied by the affidavits of two freeholders, resident in the same county in which the applicant resides or intends to locate, stating that the appplicant is the person named in the accompanying diploma and application for a certificate. The diploma received by the board shall be returned to the person owning the same. Such applicant shall pay to said board the sum of six dollars at the time of making such application.

SEC. 5. All persons practicing dentistry in the state of Indiana when this law goes into effect, and desiring to continue the same, shall within ninety days thereafter obtain a license by tendering to the clerk of the circuit court of the county in which they reside the certificate of registration or a permit issued by the State Board of Dental Examiners held by them, or by exhibiting to such clerk the record of such certificate in the recorder's office of the county of their residence, which certificate or record, when presented to the clerk, shall entitle the holder to a license to practice dentistry in the state of Indiana.

SEC. 6. In the event an applicant for a certificate from the State Board of Dental Examiners shall present a diploma from a dental college which is not recognized as maintaining a sufficiently high grade or standard of dental education as defined and fixed in the records of the board, the applicant shall have the privilege of being examined as to his qualifications to practice dentistry, in such manner as the board shall provide, and if he shall pass such examination satisfactorily to the board he shall receive a certificate the same as if he had presented a satisfactory diploma and other evidences of qualifications for the practice of dentistry. But if he should fail to pass such examination he shall be permitted to submit to another examination within twelve months from the time of the first examination. He shall pay to the State Board of Dental Examiners the sum of twenty dollars for such examination: *Provided, however,* That the fee for a re-examination or for any subsequent examination shall be only ten dollars; and *Provided, further,* That if such applicant shall fail to pass the examination prescribed by said Board of Dental Examiners he shall have the right to an appeal to the circuit or superior court of the county in which such examination shall have been held, requiring said board to show cause why such applicant should not be permitted to practice dentistry, upon the applicant giving a good and satisfactory bond in the sum of two hundred dollars, to be approved by said court, to secure the costs of such appeal should the appeal be determined against him.

SEC. 7. Upon the receipt of the certificate by the applicant from the State Board, the applicant shall upon presentation thereof to the clerk of the circuit court of the county in which he resides receive from such clerk a license to practice dentistry in the state of Indiana. The person receiving such license shall pay to the clerk fifty cents as his fee for issuing and recording such license as hereinafter provided.

SEC. 8. In case of change of residence from one county to another within this state, the holder of a dentist's license shall obtain a new license in the county where he proposes to reside by filing with the clerk of the circuit court the license obtained by him in the county in which he last resided, in the same manner as provided for on the presentation of his certificate from the State Board of Dental Examiners, and the clerk shall issue him a new license.

SEC. 9. It shall be the duty of the clerk of the circuit court of the county in which an applicant resides or proposes to locate to issue to the person presenting such certificate, as hereinbefore provided, a license over his official seal in the following form: State of Indiana, County of .... ss: I, ...Clerk of the.................Circuit Court, in the State of Indiana, do hereby certify that.........................has complied with the laws of Indiana relating to the practice of dentistry in the county aforesaid. Witness my hand and the seal of said Court, this ....day of.........................

........................Clerk.

SEC. 10. The clerk shall enter of record the name, age, place of birth, and address of the applicant, and the person so registering shall subscribe to and verify by oath before the clerk an affidavit concerning such facts, which, if willfully false, shall subject the affiant to conviction for perjury.

SEC. 11. The clerk shall furnish annually, on the first day of January, to the State Board of Dental Examiners, upon blanks furnished by such board, a duplicate list of all certificates received and licenses issued by him during the preceding year, and shall include therein the date of issue of such license, and the name, age, and residence of the person receiving the same.

SEC. 12. The Governor shall have power to remove any member of the board for incompetency, gross immorality, for any abuse of his official power, or for any other good cause, and may fill any vacancy occasioned by removal, death, resignation, or otherwise by appointment. Any person appointed to fill any vacancy on such board, whether caused by death, resignation, removal, or otherwise, shall hold for the unexpired term of the member whose place he is appointed to fill.

SEC. 13. The Board of Dental Examiners shall hold regular meetings, at such place as may be fixed by the board, on the second Tuesday of January and the second Tuesday of June of each year, and as often in addition as may be necessary for the transaction of such business as may properly come under the provisions of this act, and it shall have power to make all necessary rules and regulations in accordance with this act. Special meetings may be called at any time by any three members of the board, to be held at such time and place as may be designated in the call. The board shall elect a president and secretary, and the secretary shall be *ex-officio* treasurer of the board. For their services the members shall receive the sum of ten dollars per day and their traveling expenses necessarily incurred in attendance upon meetings. It shall be the duty of the board to keep a record of all applications for certificates, and such record shall contain all the facts set forth in such applications, including the action of the board thereon, and said board may employ a clerk and allow a reasonable compensation for such work.

SEC. 14. The members of the State Board of Dental Examiners are authorized to administer oaths in matters regarding the discharge of their official duties. The said board is charged with the duty of enforcing this act, and it shall be the duty of the prosecuting attorney, on the complaint of the board or any member thereof, to prosecute any violation of this act. And any prosecuting attorney who upon receipt from the board, or any member thereof, of an affidavit charging any person within his jurisdiction of a violation of the dental laws of the state of Indiana, or of any of them, who shall fail to prosecute such offender criminally, shall be guilty of a breach of official duty.

SEC. 15. The board shall from time to time establish and record, in a record kept by them for that purpose, a schedule of the minimum requirements which must be complied with by applicants for certificates to practice dentistry before they shall be entitled to receive a certificate.

SEC. 16. The board shall also, in like manner, establish and cause to be recorded in such record a schedule of the minimum requirements and rules for the recognition of dental colleges, so as to keep these requirements not lower than the average standard of dental education in other states. After the year 1899, no change shall be made in such schedule of requirements in any year after the month of January of such year. Nor shall any change be made to have any retroactive effect, or that shall affect students theretofore matriculated. Such record shall at all times be open to examination by the public.

SEC. 17. The board shall have power to make and establish all necessary rules and regulations for reciprocal recognition of certificates issued by other states, and to prevent unjust and arbitrary examinations by other states of graduates in dentistry from dental colleges in this state who have fulfilled its requirements.

SEC. 18. Where an application for a certificate is made and a diploma submitted as herein provided, it shall be the duty of the board to determine from the evidence presented whether such diploma rightfully belongs to and was issued to the person making application for the certificate, and whether the dental college that issued the diploma maintains a standard of dental education conforming to that fixed by the board, and whether the application otherwise complies with the rules of the board. If these facts are shown by competent evidence, it shall be the duty of the board to issue a certificate signed by its president and secretary, and over its official seal, stating that the person applying for such certificate and possessing such diploma is entitled to a license to practice dentistry in the state of Indiana.

SEC. 19. The board shall have the right to review the evidence upon which a license has been obtained, and if it shall be found that a license has been obtained by fraud or misrepresentation, the board shall revoke such license.

SEC. 20. The board may refuse to grant a certificate to any person guilty of felony, or gross immorality, or addicted to the liquor or drug habit to such a degree as to render him unfit to practice dentistry, or to any person who may be found by the board to be insane; and may, after notice and hearing, revoke a certificate and any license which may have been granted thereon for like cause. An appeal may be taken from the action of the board to the circuit or superior court of the county in which the certificate was refused or revoked by the board, upon the applicant giving a good and satisfactory bond in the sum of two hundred dollars, to be approved by the court, to secure the costs of such appeal should the appeal be determined against him.

SEC. 21. It shall be the duty of the attorney-general, and of the prosecuting attorney of the court to which an appeal from any action of the board may be taken, to represent the board in any such appeal; and in case such board shall be sustained upon appeal, a fee of twenty dollars shall be taxed as a part of the costs of the appeal, in favor of the prosecuting attorney.

SEC. 22. This act shall not apply to any commissioned officer of the United States Army, Navy, or Marine Hospital service in the discharge of his official duties, nor to any dentist who is legally qualified to practice in the state or territory in which he resides, when in actual consultation with a local practitioner of this state; nor to any dentist residing on the border of a neighboring state and duly authorized to practice dentistry under the laws thereof, whose practice extends into the borders of this state; *Provided,* That such practitioner shall not open an office or appoint a place to meet patients or solicit practice within the limits of this state.

SEC. 23. This act shall not apply to licensed physicians or surgeons, who are hereby authorized to extract teeth and to perform surgical operations at their usual office, residence, or within the vicinity of their ordinary practice, whenever in their judgment the same may be necessary.

SEC. 24. To open an office for such purpose, or to announce to the public in any way an intention to practice dentistry in any county in the state, shall be to engage in the practice of dentistry within the meaning of this act.

SEC. 25. Any three members of the board may grant a permit to practice dentistry to any person who shall possess a diploma or who shall have attended not less than two years at a reputable dental college recognized by the board, and who shall file with the secretary of the board his application therefor; but such permit shall by its terms be limited to some specified period of time, not to exceed a year, and no second permit shall be granted to the same person.

SEC. 26. The holder of a permit shall not be authorized to practice dentistry thereon until the same has been presented to the clerk of the circuit court of the county in which said applicant proposes to practice and a temporary license shall have been issued thereon, which license shall show upon its face the time of the expiration of the authority given by the board to practice dentistry, for which license the same fee shall be paid as for other dental licenses. Nor shall any permit authorize the issuance of a license which does not on its face show the time at which it expires.

SEC. 27. Any person who shall practice dentistry in this state without having a license duly issued as hereinbefore provided, shall be deemed guilty of a misdemeanor, and upon conviction thereof shall be fined not less than twenty-five dollars nor more than two hundred dollars.

SEC. 28. The board shall make an annual report to the Governor and Indiana State Dental Association.

SEC. 29. All laws and parts of laws in conflict with this act are hereby repealed, and also an act entitled "An act to regulate the practice of dentistry in the State of Indiana," etc., approved March 7, 1887.

HINTS, QUERIES, AND COMMENTS.

HYDROGEN DIOXID.—We publish the following notes on the antiseptic and germicidal action of hydrogen dioxid in response to several inquiries regarding its activities for the purposes named:

"The unstable nature of hydrogen peroxid renders it a powerful and oxidizing agent, as it immediately reacts with and destroys sulfuretted hydrogen, and many other compounds susceptible of change. It possesses the advantage, sometimes a very important one, that the product of its composition (water) is neutral and destitute of chemical activity, while hydrogen peroxid itself has not the extreme tendency to act on inert organic matter which so much diminishes the practical value of the permanganates. On the other hand, hydrogen peroxid possesses true disinfectant properties of a marked character. According to P. Bert and P. Reynard (*Berl. Ber.* 15, 1585), all fermentations due to organized ferments are at once arrested by hydrogen peroxid, and the ferment is killed, while no effect is produced on soluble ferments (*e.g.* ptyalin, pepsin, diastase, pancreatin). Fibrin decomposes hydrogen peroxid, but when dissolved in hydrochloric acid, or changed into fibrin-peptone by artificial digestion, it is without action. Egg-albumin, casein, milk, urea, fats, saliva, starch, and fruit-juice are also stated to be without action on peroxid of hydrogen."—*Thorp's Dictionary of Applied Chemistry.*

"When hydrogen peroxid is brought in contact with mucous membranes or ulcerated surfaces, albuminous coagulation is immediate, with the formation of a white coating and a rapid evolution of gas. It is a very powerful antiseptic, which has been found by various experimenters, especially Dr. Pane (*Lond. Med. Rec.,* Jan., 1891), to be extremely poisonous to pathogenic germs. The conclusions of Dr. Pane were that (1) Hydrogen peroxid in a solution of 1 to 100 has an energetic disinfecting power. (2) The solution 1 to 1000 is a weak antiseptic, and inferior to the corresponding solution of corrosive sublimate. The solution of H_2O_2, in nutritive substances, 1 to 352, not only impedes the development, but after some days kills the spores of the bacillus of charbon. (3) The solution of H_2O_2, in nutritive substances, from 1 to 352 to 5052, impedes the development of the spores of the bacilli of charbon, but does not deprive them of their germinative power when they are transferred to another nutritive substance. Thus oxygenated water in nutritive substances has a more powerful action on the spores of the bacillus of charbon than has corrosive sublimate, since the spores can develop freely in a solution of gelatin of 1 to 1000 of the mercurial.

"On account of its oxidizing properties it is a powerful deodorant, rapidly destroying hydrogen sulfid and similar gases. When hydrogen peroxid is brought in contact with pus, rapid change occurs, with evolution of oxygen gas, and Dr. Pane found under the microscope that as soon as charged with gas the corpuscles become granular, lose their form, and break up into detritus.

"Its liquid form makes it specially adapted for putrid cavities and abscesses, which it will thoroughly cleanse. It cannot, however, take the place of such antiseptics as mercuric chlorid, because its influence is so immediate and fugacious. As a preventive antiseptic it is of little value. For disinfecting the hands and instruments of the surgeon it has the great advantage of immediate and powerful action, and of not staining the hands or clothing. By some surgeons it is said not to affect the instruments."—*U. S. Dispensatory.*

"Hydrogen peroxid has the power of freeing water from living organisms, a property which has been utilized in brewing. It also destroys in the wort the acid and mold ferments. In stronger doses it destroys alcoholic ferments and stops fermentation."—*C. Reisenbichler, Chem. News,* 56, 219.

"Touchard (*Bull. Gén. de Therap.,* March 8, 15, and 23) advocates the use of peroxid of hydrogen as an antiseptic and hemostatic, and is of opinion that this drug has not yet taken the place in surgery which it deserves. It causes rapid hemostasis on the capillary circulation, and has a temporary action on middle-sized arteries. Its action appears to be a vaso-constrictor one. The bactericidal power of peroxid was proved by submitting to its action the Bacillus subtilis, the bacilli of Loeffler and Friedlaender, the Bacterium termo, and other microbes, and also the fungus of Trichophyton tonsurans and Oidium albicans. All these organisms were destroyed by the peroxid. The author concludes that it is one of the most powerful of bactericidal agents, and one which can be procured chemically pure at a moderate price. It is especially useful in all microbic affections of the mouth and throat, such as diphtheria and aphthous stomatitis, etc. It may also be used in general surgery, otology, and dentistry with success."—*British Med. Journal.*

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A MONTHLY BIBLIOGRAPHY OF DENTAL LITERATURE

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The abbreviations of titles used are those common to bibliographical work, and will, it is presumed, be readily comprehended by any one familiar with dental or scientific publications. Any explanation will be gladly furnished by the compiler. A star (*) indicates a thesis.

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LIST OF UNITED STATES PATENTS

PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING JUNE, 1899.

June 6.—No. 626,287, to GEO. H. MODEMANN. Artificial tooth and plate.
" " No. 626,476, to EDWARD H. ANGLE. Tooth-regulating device.
" *13.*—No. 626,738, to CHESTER J. UNDERWOOD. Tooth crown.
" " No. 626,751, to JOHN H. CASFORD. Inhaling and spraying apparatus.
" " No. 626,779, to WM. H. BAIRD. Artificial teeth.
" " No. 626,810, to WALTER A. INGLEHART. Fountain spittoon.
" *20.*—No. 31,028, to D. L. and C. WAMSLEY. Tooth-brush and powder-rack. (Design.)
" *27.*—No. 627,617, to FRANK HURLBUT. Dental spittoon.
" " No. 627,720, to LEONARD F. DUNN. Artificial tooth.

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ORIGINAL COMMUNICATIONS.

Annual Address.

BY H. J. BURKHART, D.D.S., PRESIDENT.

(Read before the National Dental Association, August 1, 1899.)

It is my pleasant privilege to welcome here to-day this vast assemblage of representatives of the profession from this country and the distinguished gentlemen from abroad, who have, at no little sacrifice, come here to show by their presence that they are loyal to and interested in the work of this association. It is a happy augury to have such a large and representative gathering as this, and I congratulate you all upon the evidence on every hand of the cordial feeling which should exist in any profession organized for mutual improvement and the welfare of humanity. On behalf of the National Dental Association I take great pleasure in extending to you all a most hearty welcome and a cordial invitation to participate in the deliberations of the meeting.

I shall endeavor in as brief and concise a manner as possible to present for your consideration the various questions of importance which you will be called upon to decide this year. It is not my intention to anticipate the report of any committee or to draw invidious comparisons. My opinions are offered only after careful reflection and with a sincere desire for the advancement of this association.

INTERNATIONAL CONGRESS, 1900.

A committee was appointed last year to devise measures for the proper representation of the profession in this country at the International Congress in Paris in 1900. The chairman of that committee will make a full report later, and I trust that the recommendations he may make will receive your indorsement and approval, so that our French brethren may again have evidence of the high regard in which they are held by us, and also, in a small way, to repay them for the interest they manifested in the Columbian Dental Congress. It is hoped that the date of the next annual meeting of this association can be arranged so that it will not conflict with this congress and give the profession in this country an opportunity to demonstrate to the world that the American dentist intends to remain in the front rank.

Army Medical Museum and Library.

Your attention is invited to the report of the committee on Army Medical Museum and Library. The labors of this committee have been arduous, and the work which belongs to the many has, as usual, fallen upon the few. It is a matter for sincere regret that so little interest is taken in this worthy institution, which I construe as being due more to carelessness than lack of appreciation. I appeal to the whole profession to aid in bringing together the countless number of valuable specimens now scattered about the country, and to assist the committee in their laudable efforts to bring this department up to a high standard of usefulness.

Committee on History.

I cordially indorse the report of the Committee on History, and ask you to co-operate with it in the laborious task of gathering material for an interesting and reliable history of the profession.

Membership.

An inspection of the roster of this association will reveal the fact that scores of prominent members of the profession do not hold membership here. This is a condition which should not exist, and every effort should be made to so formulate the rules that no worthy practitioner will be excluded. The by-laws should be amended so that any clean, honest, ethical dentist may gain membership here. Instead of a mere handful, there should be a membership roll of at least several thousand. The requirements at present are of such a restrictive character, and the method of electing so unsatisfactory and cumbersome, that there should be no hesitation in a radical departure. The meetings of the state societies are scattered throughout the year, and when the main body convenes at some distant point little or no interest is taken in electing delegates who intend to complete membership. The clause denying membership to those without a degree who have entered the profession since 1875 is absurd, because a man with no degree is, in most instances, quite as well qualified to sit here as one who received his D.D.S. *in absentia* prior to that time, and there is no good reason why the time limit should be placed as far back as 1875. It would be "a consummation devoutly to be wished" if none could be elected until after "some meritorious work" had been done; but, unfortunately, no standard has been adopted, and until one is agreed upon or a permanent board of arbitration appointed that clause should be eliminated.

I recommend the adoption of the following amendment: Article III, Section 3, to read as follows: "All delegate members shall be practitioners of dentistry. They shall be received from permanently organized dental societies working under the code of ethics of the National Dental Association, elected by ballot at some regular meeting of their society, and in the event of charges being filed against an applicant for membership the committee on credentials shall have full power to examine and pass upon the same." I also recommend the repeal of Sections 1 and 4, Article IV.

The adoption of this amendment will provide an easy way of quickly increasing our membership and bring in many desirable men. It would be ridiculous to say that the New York Odontological Society, the Chicago Dental Society, and many similar organizations of a like local character are not equal to, and in many instances superior to, some state societies, and, that fact being admitted, no good reason exists for denying them the privilege of membership here. The qualifications for membership should be made broad and liberal, and an effort made to efface the impression that this national body is a close corporation or a sort of dental trust. The burden which has been borne by a few should be shifted to the backs of the many, and that can only be done by wiping out moss-covered rules and keeping in touch with the spirit of the times, so that this shall become a great popular and industrious organization.

SECTIONS.

The efficiency of the sectional plan of work has been much discussed, and a glance at the program for this meeting will make it plain to any one that there are busy times ahead for each section. A number of prominent essayists have voluntarily informed me that if section meetings are well attended and a full and proper discussion of the papers obtained they will waive the privilege of presenting their work before the main body, and in that way materially assist in disposing of the entire program. It should be understood that after a paper has been presented to a section the essayist has not the right to withdraw it except with the consent of the section; that no paper shall be considered which has been previously read before any other society, and that every paper is the property of the section unless otherwise stipulated at the time of presentation.

It seems to me that sections should be consolidated and the number materially reduced, which would eliminate no little amount of friction. Section work for the next annual meeting should be planned here, and a business committee appointed which shall have general supervision of all papers presented, so that they may be referred to the sections to which they properly belong.

PUBLICATION OF TRANSACTIONS.

From time immemorial the publication of the Transactions has been an endless source of annoyance to the officers and Publication Committee, and much time has been consumed in an effort to place the responsibility for the non-appearance of this troublesome volume upon any but the guilty parties. The publishers have not always been at fault. In many instances much delay has ensued by a division of responsibility, procrastination, and indolence of those to whom proofs have been sent for correction and revision. Proceedings of societies to be of any value should be ready for distribution within three months after the close of a meeting. I recommend that the secretary be authorized to make a contract for the printing of the proceedings of this meeting on or before November 1 of this year, and that the publishers shall be required to give a sufficient bond to insure the fulfillment of the contract; and, further, that the Publication Committee be instructed and given full power, where members do not return corrected proof sheets promptly, to eliminate such matter entirely or only publish that which they deem proper. This suggestion may appear drastic, but some heroic measure is necessary to correct this time-honored abuse and distressingly unbusiness-like procedure.

Committee on Journal.

A committee has been in existence some years to take into consideration the desirability of establishing a journal. I have been unable to discover any real sentiment in favor of a new publication, because those in existence now are of such a high character and offer such excellent facilities for publishing and illustrating papers that it would not seem to be the part of wisdom to launch an enterprise of this nature, which would necessitate the expenditure of a large sum of money and quite likely prove to be an annoying and vexatious undertaking. It may be shocking to the fine feelings of extreme advocates of independence in journalism to be obliged to live in this practical age, but before their ideal can be realized they should be made to understand that it would be more consistent to support those which we have now, and to be more punctual in attending and contributing to the success of society meetings. The only enthusiasm for an independent journal that I have seen was at some dental dinner—after the walnuts and wine.

Executive Council.

The proposition to vest authority in an executive council and eliminate all business matters from the sessions of the main body should receive your careful consideration. There is no doubt that much valuable time is often frittered away in debating questions of a trifling nature.

The Committee on Revision of the By-Laws appointed by the American Dental Association in 1891 reported a set of rules which, with slight modifications, would be a great improvement and have a tendency to expedite the transaction of business. The salient feature of that report was vesting power in an executive council to call meetings of the association in the afternoon (when this body is usually not in session) for the disposal of all routine business, amendments to the by-laws, election of officers, and time and place of next meeting. It will be observed that this plan would take from the association no power which it now has, and every member would have a voice in determining questions of business and society policy precisely as at present, with the advantage of previous notice that all general matters would be disposed of at a particular session. (The chair is diametrically opposed to the proposition of allowing a committee to elect officers, decide upon time and place of meeting, or amendments to the by-laws.) One short session will be sufficient to decide questions of so much importance to the whole membership. A fair trial can do no harm, and I recommend the adoption of the proposed amendment.

DISCUSSION OF PAPERS.

I also recommend the adoption of a rule limiting the time for discussion of papers which come before the general meeting as follows: Ten minutes for opening and five minutes for general discussion. It has been the custom of many gentlemen to assume that in order to clearly state their positions it is necessary to go into the minutiæ of every phase of a question, and recall step by step the history and progress of events well known to the average dentist. The long, dreary, tiresome, and irrelevant debate so often encountered at meetings of any considerable size detracts in a large measure from their usefulness. Any man with clear and well-defined ideas should be able to properly express himself in five minutes. There probably would never be the slightest difficulty in obtaining unanimous consent for extra time should the contingency arise. The tendency of many to occupy so much time in defense of fancied reflections of a more or less personal nature (of no interest to any one but themselves) and the reiteration of pet theories and doubtful modes of practice should be severely condemned, and the chair vested with full power to promptly curtail unnecessary debate.

SCIENTIFIC BUREAU.

Various suggestions have been advanced for the raising of funds and the establishment of a permanent bureau having for its purpose the encouragement of original investigation, but, as with many other good things, there has been an interminable amount of talk, with the usual result of nothing done. It is a well-known fact that the large majority of men in the dental profession who have done original work are poor, and as they have given freely of their knowledge and every one has profited by their discoveries, it is but fair—if we intend to be known as honest men—to inaugurate some movement which in the future will properly and adequately support those who are willing to engage in scientific work. At present there is little incentive and meager facility for young men to engage in this work after graduation. The necessarily expensive paraphernalia required is beyond the reach of many, so some plan should be devised by this body to provide a proper mode of procedure. The National Association should take upon itself this important work, and if a competent bureau is established here there will be little difficulty in obtaining financial assistance from other societies. The first essential is a well-appointed, energetic, and competent section, and I recommend the appointment of a committee of three to report at this meeting and suggest ways and means for establishing a bureau of such nature.

INDORSEMENT OF PROPRIETARY PREPARATIONS.

With the discovery of any new, or the resurrection of any old, germicide it has been the custom for various manufacturers to place upon the market countless numbers of deliciously perfumed and pleasant tasting preparations designed to destroy every known form of bacteria in the twinkling of an eye, and they have religiously asked the dental profession to resolve itself into a respectable advertising agency. Attractively labeled sample bottles, promises of great financial returns from stock dividends, aided by suave manners and smooth tongues, have usually been sufficient to enlist the aid of gentlemen who have always considered themselves strictly ethical. It seems incredible that professional men can be found who will indorse formulas of which they know nothing and preparations of which they have no control, and recommend the same to patients knowing that they are to be enriched by a large sale of the article. I commend the ethical side of this matter to the thoughtful consideration of erring brethren. It is time a halt was called and a stinging rebuke administered to those who go about the country boasting that dentists are easy marks and ready prey for dealers in green goods and venders of gold bricks.

REVISION OF CODE.

Serious consideration should be given to the report of the Committee on Revision of the Code, and stringent measures adopted to check the tendency to unethical conduct which has been so strikingly apparent of late, and this association should insist that every member connected with it conduct himself in a respectable professional manner. A high order of ethical conduct should be observed by those connected with colleges, so that infirmary abuses may be corrected and young men made to understand that the path of honor lies not in the perpetuation of quackery, but in the good opinion of clean, honest, reputable practitioners. The shallow excuses so often advanced to condone infractions of the code should receive no consideration, because its provisions are plain and easy of interpretation by any right-minded individual. The honor and good name of the profession are at stake, and this National Association must demand of its members a strict observance of the spirit and letter of the Code.

ARMY AND NAVY, UNIFICATION, LIFE INSURANCE, ETC.

It is not from a pessimistic or chiding spirit that I direct your attention to a number of questions that have been under discussion in dental societies for a decade or more which are no nearer solution to-day than when first presented. Much valuable time has been consumed in their consideration, and practically nothing has been accomplished. The time seems ripe for energetic concerted action to secure the appointment of dentists in the army and navy, unification of state laws, dental examination for life insurance, the education of the public in oral hygiene, and the insistence upon a higher preliminary standard for matriculation in dental schools.

It is not necessary for me to present arguments to show the necessity for appointing dentists in the army and navy. The most essential point to be determined is whether or not the dental profession knows its own mind, and, if it does, to agree upon some measure which can be presented to Congress as representing the best thought and sentiment of the profession on this important subject. I therefore recommend that the Committee on Dentists in the Army and Navy be instructed to prepare a bill and report at some session to-morrow, and then let there be appointed a large, energetic, and representative committee, free from dead wood and drones, to assist the local members at Washington in bringing the matter to a successful issue. The time is propitious for securing affirmative action at the next session of Congress. The abundance of evidence that can be produced of the inefficiency of the army and navy medical bureaus during the late war, and the unnecessary suffering of our soldiers and sailors for lack of proper dental attention, will prove a powerful argument in securing necessary legislation. It is a great national crime to deny relief to and refuse to alleviate the sufferings of those who risk their lives in defence of the flag. Well-directed and united action by the dental profession, together with the powerful influence of public sentiment, will surely accomplish the desired result.

The desirability of a unification of the state laws is apparent to any observer. Much time has been wasted in an attempt to show that most state laws were not in accordance with the Constitution, because the liberty of the individual was restricted. The United States Supreme Court has affirmed the validity of the New York state medical law, and declared that the states under the police power granted by the Federal Constitution have the right to control their own affairs in framing laws to protect the health of the people. While it may not be possible to secure the same high standard in every state at once, it is a fact that there are at present three states which do have an interchange of licenses, and who stand ready to indorse licenses from any other state adopting their standard. The onward march has commenced, and I venture the prediction that with proper assistance from this association the day is not far distant when a license granted in one state will be made the passport for practice not only on this continent, but all over the world.

Life insurance companies and the various educational authorities should be made to feel the necessity for proper care of the teeth in order to conserve the health of the individual. Capable and industrious committees should be appointed to consider these questions and report—not a year or five years from now, but at this meeting—some proper and feasible method for attaining the desired result.

Preliminary Standard for Matriculation.

I approach the subject of exacting a higher preliminary standard for matriculation with some hesitation, well knowing the difference of opinion which exists on this question; but it seems to me that the influence of the members of this association should be used in an effort to retain that which has already been accomplished and aid in every proper way a further advance of the preliminary requirement. Abundant evidence is at hand to show the necessity for demanding a higher mental equipment for those intending to practice dentistry, and the public records of the examinations in states with an advanced requirement amply prove the wisdom of the laws now in force. The striking difference in the character of the papers examined in the state of New York during the past year and those of a few years ago is sufficient evidence that a high preliminary educational standard should be maintained. It is well known that the educational machinery of the several states is not the same, and that it would be impossible to at once exact the standard in force in this state in every other; but with steady, persistent effort on the part of educational authorities other sections of the country will soon see the wisdom of an advance along this line. Weak colleges should be consolidated, and every facility offered to increase the efficiency of the schools.

This is not the time to take hasty or ill-advised steps, because no great reform was ever carried to a successful issue in a day. The spirit of harmony and forbearance should always be maintained in considering questions of vital importance to the whole profession. Each national body should attend strictly to its own affairs, and endeavor by an interchange of ideas to finally and harmoniously reach the desired goal. With the elimination of petty jealousies and the desire for personal power and gain all discordant elements can be removed. Bogus reformers, cranks, and mercenary individuals should be sent to the rear and strenuous efforts made to find a common ground for all divergent elements to stand upon, and this can be accomplished by a spirit of conciliation, which should always be observed in considering questions which affect interests of such a vital nature. No one man can claim title to all the honesty and intelligence, or consider himself the absolute dictator of matters pertaining to the welfare of the whole profession. Too close connection with college or examining board work and the seclusion of an editorial sanctum are liable to warp the opinions of many well-meaning men; and, while their views should receive careful attention, it must not be forgotten that the large army of lay members of the profession is entitled to consideration, and that no question is rightly settled which does not deal fairly with every interest. I am sure I express the hope of every well-wisher of the profession that all discordant elements may soon be brought into complete harmony.

There is an element abroad in the land that considers itself competent to pass judgment upon dental matters of every conceivable shape and form, and to criticise society meetings and societies in general for not approaching their narrow ideal. It usually comes from men who are not members, and who do not even take the trouble of attending a meeting. This was notably true of the old American Association, and no society ever suffered more by this sort of unfair and unjust criticism. Even to-day we hear calumnies uttered about it which should bring the blush of shame to the cheeks of those who must know their opinions are warped by grievances of a personal nature. That there are objectionable features in every system or organization cannot be denied, but that is not a sufficient reason for withholding support. While honest criticism is always invited, that of a captious nature should be avoided. Let no man condemn without first making an effort to correct existing errors. There is need for a great national dental organization, and it is the duty of every member of the profession to heartily and loyally support this association. With a few necessary changes it can be made a powerful instrument for good and materially assist in advancing the interests of the whole profession. It should be made the forum for a free and fair discussion of all questions, and no narrow soul should find an abiding-place therein. Patriotism and loyalty to dental organizations should be instilled into the hearts of all young men. The doubts and fears expressed for the permanency of this organization have not been realized, and if I am able to correctly interpret the signs of the times the faint-hearted need be troubled no longer. Absolute harmony prevails everywhere, and the day is not far distant when croakers will seek membership elsewhere. With an earnest effort the highest ideal will soon be reached, and no man, be his attainments ever so brilliant, need be ashamed or humiliated by owning allegiance to the National Dental Association.

We meet to-day on historic ground. Forty years ago a little company gathered here to lay the foundation for a national organization. Many of those in attendance at that first meeting have long since passed to their reward, and it remains for us to keep their memory green by diligently and faithfully striving for the elevation of the profession which they loved so much and for which they made so many sacrifices. In this age of hurry and excitement too little attention is devoted to the trials and discouragements which were met on every hand by the pioneers of the profession. The difficulties surmounted, the ability and devotion displayed, and the matchless loyalty manifested for a struggling profession should always remain as a proud heritage to coming generations. With sagacity of a high order, prudence, and an intense devotion, dentistry was placed upon a safe and enduring foundation. A cursory glance in retrospection only is necessary to bring out in bold relief the meager facilities for gaining and imparting knowledge then existing, and it is a source of constant wonder that dentistry was finally elevated to the dignity of a profession. The wonderful progress of our calling during the closing years of the century is as marvelous as it has been great, and were I endowed with prophetic vision I should have little hesitation in predicting that the achievements of the past are nothing compared with what the future has in store. Education and progress go hand in hand. Then let us improve the opportunities of the present, laboring steadfastly and unceasingly to reach the highest ideal of professional development.

SUSCEPTIBILITY AND IMMUNITY TO DENTAL CARIES.

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THE questions of susceptibility and immunity to dental caries have not had the amount of consideration by dentists that their importance demands. It has seemed to me that it is time now that the serious discussion of these subjects be undertaken, and this short paper is intended only as the introduction of it for that purpose. My presumption is that many years of study will be required for its proper elucidation. Caries of the teeth is and has been so common and our people are so generally afflicted that most of us have seemed to regard it as common to the human race, and that practically all are afflicted. Certainly, so nearly all people, in this country at least, have caries of their teeth to some extent that this general proposition would seem to be correct. Yet there are a sufficient number of exceptions to this general rule that every one who has been long in practice has noted,—persons who have been wholly immune during a long life. In the past this immunity has been attributed to some superior quality of the teeth of these persons. The teeth themselves have been regarded as more perfect in their structure and richer in lime-salts, and the supposition has been that on this account the teeth have been able to resist decay under conditions which would destroy teeth of less perfect structure.

Recent investigations that have been conducted by myself (DENTAL COSMOS, May, 1895) and by Dr. J. Leon Williams, of London (DENTAL COSMOS, March and April, 1897), have shown that this was an erroneous opinion, and that caries is not dependent upon the quality of the teeth as to their structure or their perfect or imperfect calcification. These facts have been so clearly set forth, the studies by which they have been determined have been so complete, and their publication has been so recent that a reiteration of them at the present time seems unnecessary. They show that all human teeth are so nearly the same in their calcification that differences in the effects of acids upon the lime-salts of the teeth of different persons are practically *nil*. They show that in physical structure there are wide differences in the teeth of different persons, both in the enamel and dentin; that while the teeth of some have enamel which is practically perfect in all its parts, the teeth of others present grave imperfections of physical structure, in that the developmental grooves are imperfectly closed, leaving fissures, pits, and openings of various sorts and shapes in its substance. Also that the dentin of some is very perfect in physical structure, while the dentin of others has many interglobular spaces in its substance, and presents granular areas in which there is much of physical imperfection. They show, further, that these physical imperfections in the teeth are in no proper sense a cause of caries of the teeth; that among persons wholly immune to caries these imperfections of structure are proportionately as frequent as among persons whose teeth decay. That even where the imperfections of the enamel are such as to form cavities in its substance reaching to the dentin, no decay has occurred during a long life. They show, indeed, that these imperfections can at most only give greater opportunity for the action of the cause of decay when this cause is present and active, and have no further relation to that cause. Therefore teeth which present the worst faults of structure may not decay, and will not decay in persons immune to caries; while teeth of the most perfect physical structure will succumb to caries in susceptible persons.

In making these statements I do not forget that the studies upon which these conclusions are based are recent (though a goodly number of the facts are old), that they are opposed to the ideas that were held previously by most persons in the profession, and that many have yet great difficulty in accepting them as conclusive. While I have much sympathy with these latter, I shall not now stop to argue this point further than to say that the facts are physical in their nature and capable of accurate demonstration, and have had this demonstration. It should be remembered that physical facts, when once reduced to laboratory forms and ascertained, remain permanent. Granite is hard as compared with other substances. It may present degrees of hardness, but no process of demonstration or reasoning can remove the fact that granite is hard. It is precisely the same with the facts I have been stating. They are physical facts, and must stand. It should be remembered further that most of the advancements made in medicine and surgery within the last half-century have been due to laboratory demonstration. Very few diseases come to be understood until their investigation has been reduced to laboratory methods. From the very nature of things this must be true, and must remain true of most pathological conditions. One might as well undertake the study of anatomy merely by looking at the outside of the man, as to try to make out a diseased condition without the aid of laboratory methods of study. It is by the use of laboratory methods that we arrive at accuracy in the explanation of the meaning of groups of symptoms and are enabled to diagnose conditions accurately.

Heretofore the profession had been looking to the teeth themselves for the answer to the question as to why some teeth decay and others do not. The facts stated above show that this was an error. In caries the teeth are acted upon. They do not themselves act in the premises. The agents acting to produce decay are outside of the teeth, and must be found in their environment. We know already very accurately what the active agents are, and can follow their action in detail in laboratory demonstration and fix all of the principal facts in their order of occurrence. The active agents are certain micro-organisms that during growth produce lactic acid, which in contact with the teeth dissolves their lime-salts; and then the micro-organisms enter the tooth-structure and gradually destroy the organic substance, breaking down the whole fabric. This was fixed by the work of Dr. W. D. Miller, of Berlin, and, while other facts regarding this process may be developed, there is not the slightest probability that these facts will be materially modified by future studies or demonstrations.

But in all of this we fail to find an answer to the questions of immunity and susceptibility of the teeth of individuals to caries. The cause which is so active in some individuals is inactive in others. The reasons for this difference in persons have not been reduced to demonstration. That the difference exists is a clinical fact, observed and noted by every practitioner of considerable experience. We have also learned some collateral facts which influence the action of the cause of caries in a marked degree. As yet these are all clinical in character, and have about them all of the uncertainties of purely clinical data.

Observations already made render it certain that caries of the teeth has its beginning only when the conditions of the oral secretions are such that the micro-organisms causing caries form gelatinous plaques, by which they are glued to the surfaces of the teeth. This process seems necessary to the first starting of the process of decay, and until a cavity is formed by which the micro-organisms can enter the tooth-structure and be so protected as to prevent in a large degree the dissipation in the fluids of the mouth of the acid formed by them. It is well demonstrated that the whole saliva never becomes sufficiently acid to act upon the teeth, and that so long as micro-organisms have no protection from the dissipation of the acids they form they cannot produce caries. The formation of gelatinous plaques by which they glue themselves to the surfaces of the teeth and cover themselves in accomplishes this protection until a breach has been made and the micro-organisms have entered the tooth-structure. This is well shown by the confinement of the beginnings of caries to certain selected points upon the teeth where micro-organisms may act with the least disturbance, whereas if the whole saliva was sufficiently acid to act the teeth would decay all over, instead of at selected points of beginning.

The formation of gelatinous plaques by caries fungus does not occur in every mouth, though the organisms may be growing. They do grow in every mouth, though no decay may occur. The formation or the failure of formation of gelatin seems to depend upon something in the saliva, the nature of which is as yet unknown. In growing the caries fungus artificially it can be made to form this gelatinous material or to grow without forming it, at will, by certain manipulations of the culture-medium. Yet the nature of these changes is not such as to give a clue to what may be the changes in the saliva which favor or hinder its formation. Indeed, this matter is so delicate that it is almost impossible to make two samples of broth in which there will not be differences in the disposition to form gelatin during the growth of caries fungus. I would not, however, have it understood that any and every gummy material found in the mouth or about the teeth is the gelatinous plaques of caries fungus, for other micro-organisms may also form gelatinous masses. The gelatinous plaque of the caries fungus is a thin, transparent film that usually escapes observation, and which is revealed only by careful search. It is not the thick mass of materies alba so frequently found upon the teeth, nor is it the whitish gummy material known as sordes, which is often prominent in fevers and often present in the mouth in smaller quantities in the absence of fever.

The effect of these studies and the propositions which logically follow is to divert the search for those factors which predispose persons to caries of the teeth from the teeth themselves, where they were previously looked for, to the surroundings of the teeth, or the oral fluids and the bodily conditions which give character to the secretions. The teeth themselves are the most unchanging of the tissues of the human body, while the secretions perhaps are the least constant, and are affected by the slightest causes. For this reason fluctuation, rather than constancy, in the intensity of the action of caries is to be expected.

Susceptibility to disease and predisposition to disease are terms which are so closely allied that they may well be used interchangeably, though in certain phases of the meaning of the words a slight difference may be recognized. A person predisposed to disease is susceptible to disease, but a person may become susceptible who has not previously been disposed to disease. Susceptibility is a present condition; predisposition is something that has existed before.

I shall speak of these subjects from the standpoint of a somewhat strict family practice of forty years in one locality, in which, while there were many families that were permanent residents for the entire period, there were also many accessions from widely different portions of the country, and not a few from foreign countries. It being also an educational center, I had the observation of many young people temporarily during their school life.

With our present knowledge it may be stated that the susceptibility to caries of the teeth is influenced by heredity, by the age of the person, and by fluctuations of bodily condition.

Influence of Heredity.

I suppose the hereditary predisposition of certain families to caries has been so generally observed that it will not be questioned, and only needs mention. In the practical consideration of cases as they are presented to us when we have the care of families of children the hereditary predisposition to caries is of first importance. When the family remains in one locality, the children living under conditions similar to those of the parents in their childhood, the susceptibility to caries will be very similar in the great majority of cases. This will hold good even to the particular teeth and localities first attacked, the order of occurrence of cavities, and the particular age at which they occur. In some of my families the first cavities in parents, children, and grandchildren were in the proximate surfaces of the upper incisors, discovered first at the age of eleven to fourteen. In the majority of families the first cavities were in the occlusal surfaces of the first molars. I had other certain families in which in the parents, children, and grandchildren the first cavities were in the proximate surfaces of the upper bicuspids, occurring at the age of fifteen to eighteen. In these the observation has been personal for the children and grandchildren, but in some cases elicited by inquiry for the parents. Over and over again decay of particular teeth occurs at a given age in parents and children. In some families it will occur a little earlier in the children, in other families a year or two later.

In those who have been changing residence, or in families that have changed their manner of life, there has not been the same close similarity, particularly as to the time of life of the beginning of decay of the teeth. It has been noted particularly in families from European countries that there have been complete reversions in which parents who were practically immune have presented me with children that were very susceptible to caries. I have noted, however, several instances in which this was reversed, so that very susceptible parents from foreign countries presented children who were insusceptible. In those cases in which there are great differences in the susceptibility of the father and mother there are likely to be sharp differences in the susceptibility of the different children to caries, some following the one parent, some the other, though in the majority of instances it seems that the inheritance is from the more susceptible parent. This observation would indicate that the predisposition to caries was rapidly increasing, and yet my observation, taken as a whole, does not warrant this conclusion. The teeth of the generation growing up now do not decay so badly as did those of the generation of my early practice. These two statements seem incongruous. They are certainly both true. But it is also true that by better treatment latterly caries has been more closely confined to early youth, and its intensity has been diminished. The rule is that the hereditary predisposition to caries disappears with the coming of adult age.

The Influence of Age.

Caries of the teeth is, in its most practical aspects, a disease of youth. My observation of persons who have no filling done is that very few of them lose any considerable number of teeth from caries the beginnings of which have not occurred before the age of twenty years. The actual loss from caries of most of the teeth will occur later, and in many cases the intensity of the carious process will seem to be increased later, but the beginnings of nearly all the cavities have occurred early in life. In cases of great intensity of the carious process the teeth will practically all be destroyed, and at an earlier age, the greatest intensity occurring anywhere from eighteen to twenty-two or three.

The effect of early radical treatment by filling in the milder cases, and also in many of the more severe, is to change this order in such a way that at the time of life at which caries would be making its worst ravages, from twenty to thirty years, *the person becomes immune.*

This immunity relates to the beginnings of carious areas rather than to the progress of cavities that have begun. Yet in many cases the immunity extends to the stoppage of many, sometimes all, of the areas of decay which have started. This immunity to the beginning of carious areas is a feature of the abatement of the susceptibility to dental caries which must not be lost sight of in any consideration of the subject. Caries that has started and become fixed in the dentin will progress though the conditions may have become such that no beginnings of new cavities will occur. This feature of caries becomes very prominent when a large number of cases are closely followed with records that will distinguish primary fillings from refillings in cavities where fillings have failed. It becomes still more prominent when the filling is so done from the beginning that there will be no refilling. From the number of persons in whom immunity has occurred in my own practice I conclude that this ought to become the general rule in cases in which the primary fillings have been permanent fillings. My observation in this matter includes many persons in families in whom the hereditary conditions were of the worst form. It includes cases where both parents had had much decay in their youth, and when caries had begun in the children in the same teeth, the same localities in the teeth, and at the same age as it had in the parents. But in the children, instead of increasing in intensity, there was an early abatement of susceptibility, and fewer cavities occurred than in the parents. A part of this was due to better care. But, again, this better care was due to the better conditions attained, which rendered the better care possible. By better methods of operating the teeth were kept in full and natural use in the mastication of food, and had the natural abrasive action of the excursions of food over their surfaces and the surfaces of the gums about their necks with its effect in natural cleaning. This had its salutary influence, and I regard this preservation of the complete and free use of the teeth in the mastication of food without hindrance from lodgments about the teeth or from pain as the most important element in bringing about an early abatement of susceptibility to caries.

At first glance this influence would seem to be local only, but it seems to me that there is a general influence as well; an influence which reacts in a general way, producing a better condition of the secretions and of the cellular elements of the whole person. But the principal factor is to preserve good conditions and maintain healthy, vigorous employment of the teeth, and thus be ready for and encourage that immunity which comes with adult age.

Continuance of Hereditary Predisposition.

In a few families the hereditary predisposition to caries continues into middle and advanced age. These may usually be known by getting the history of the parents and the grandparents, noting where possible the character of the operations they may have had for relief, and dividing the primary fillings from refillings. There are so many cases in which persons are continually having cavities refilled when fillings fail, that unless the refilling is eliminated and only new cavities of decay considered we are likely to be deceived and to regard the case as one in which the predisposition to caries is continuing, when, as a matter of fact, no new decays have been starting for many years. When the filling has been so done that there will be no refilling, the cases are easily made out. This should be closely looked to in all such examinations, if we would obtain a correct view of the future probabilities in the children we are to treat.

A case in point I will relate as illustrating this class of cases. A little girl, twelve years old, came into my hands with cavities in all of the first molars. The molars and bicuspids of the father were wrecked so badly by caries that I had removed them and advised that artificial teeth be not substituted for the time, throwing the whole effort of mastication upon the incisors and cuspids, which at that time presented only a single primary cavity. The mother had had much filling done, also confined to the molars and bicuspids. None of it had stood long, and decays were then starting in several of the incisors, both upper and lower, at the age of thirty-one or two. Both of her parents (the grandparents of the child) had lost their teeth from caries.

This made up a wretchedly bad history for the little patient that attracted my attention strongly even at that time, which was early in my practice; and I may say that I made special effort to conduct her case well, an interest that I never lost. In the lower first molars the pulps gave trouble and were lost three years later, and in about fifteen years the crowns of these teeth broke down. Other than this she has never lost a filling. Her fillings make a long list on my record books. First the occlusal surfaces of the molars and of the bicuspids; then the proximate surfaces, all of them, one by one; then the buccal surfaces and several lingual surfaces. At the age of thirty-four the first proximate decay occurred in the upper incisors. At the age of forty-five all of these and the proximate surfaces of the cuspids had cavities, and were filled in turn. And the last were the labial surfaces of the incisors. I have never seen a mouth that was naturally more cleanly, or one that was better cared for by the patient than this one. In form the teeth were fine, long, and bell-crowned, with excellent alignment and occlusion. The whole denture was ideal. The patient was practically never out of health. She led an easy life, but a life of fairly keen interest in her friends and surroundings. She married late and has no children.

And yet with this history new decays were starting persistently. It is the most marked case of the persistence of the tendency to caries upon my records. In this case there never was a time that caries was allowed to run on to such a degree as to increase susceptibility because of the presence of troublesome carious cavities, except very temporarily with the lower first molars. At all times the patient could chew her food comfortably and take proper care of her teeth. The slowness of the occurrence of cavities was in marked contrast with some other cases in which cavities occur in all of the teeth almost as rapidly as they appear through the gums. It is the persistence in the beginning of decay in group after group of localities in regular succession to which attention is called, and it is that which marks the case as bad in its general character.

In another case presenting a similar history upon the side of the father and grandfather on the father's side, but something approaching immunity in the family history of the mother, a little girl, eight years old, presented cavities in the occlusal and mesial surfaces of all of the first molars and proximate cavities in the upper incisors. Other cavities occurred in the teeth taking their place later, almost immediately they were in position. All of these were filled as soon as they were discovered. No temporary fillings were employed for more than one or two weeks. Mastication was never hindered; there never was a refilling, and now, at twenty, a condition of immunity seems to be fairly established. This immunity was the object sought, and which should be sought in every case. In a case of such grave predisposition to caries as this, to resort to temporary fillings that in themselves are not as radical as is required for permanent ones is almost equivalent to losing the fight. Fillings of such a character that caries will recur, or of such forms of contact points, shapes of interproximate spaces that lodgments will occur, or any conditions limiting the use of the teeth in mastication, will allow the persistence of caries, increase its intensity, and delay the coming of immunity; while the opposite condition of freedom from progressive caries, the maintaining of perfect contact points, freedom from lodgments, and continuous, full, free, and effective use of the teeth by favorable reaction upon general bodily conditions diminishes the susceptibility to caries and hastens the coming of the condition of immunity. In such a case half-hearted operating is of no use. The filling must be well done in every particular. The cutting of cavities must be full and free, with the proper extensions for prevention. All decay must be removed completely, the fillings so seated and the retention sufficient that the fillings may withstand the force of mastication; and, finally, the gold must be so well packed to the walls and margins as to prevent leakage absolutely, and be made sufficiently dense and hard.

In the ordinary cases presenting medium intensity of the carious process the same results are obtained with greater ease to both patient and operator. But this result is easier because less effort is required. The effort should be of the same quality throughout our practice with children. Note particularly that it is for children that the most perfect operating is required.

In cases of milder types of susceptibility, in which the beginnings of decay are fewer in number and the progress slower, the coming of immunity with increasing age is more certain, and the detail of operations, while more or less exacting, is easier carried out, because it brings less of wear and tear to the patient. Especially it is easier to maintain the full, free, and efficient use of the teeth. My observation is that a failure of vigorous mastication delays the coming of immunity seriously. In families where I have succeeded in this in cases of medium hereditary susceptibility, immunity is usually ushered in with adult age. Relapses of short duration occasionally occur, but are easily managed.

CAN PERMANENT FILLINGS BE MADE FOR CHILDREN?

On the question of making permanent fillings for children I have been sharply criticised.

The contention has been in part that teeth that have only lately taken their places in the arch are not sufficiently strong in their calcification to receive permanent fillings. That this contention is wrong is firmly answered by laboratory examinations, which show that the calcification is so complete that in this respect no difference should be made between the teeth of children and the teeth of adults. Clinically the answer supports the practice and adds diminished susceptibility in its favor.

The contention has been in part that the peridental membranes are not sufficiently strong to bear the necessary force. As to this, I often see these same children crack nuts upon these teeth which when placed in the dynamometer show that a force of from sixty to one hundred pounds or more has been used. I should never use more than forty pounds in the operations, and but rarely more than twenty-five pounds. Then, again, it is said that the pulps are still large in children's teeth, and there is more danger of approaching too close to them in forming cavities. This is correct, and corresponding care and judgment must be used.

Will the courage and endurance of the child suffice for these operations? This is the point upon which more depends than all else, and the one which will prevent permanent operations being undertaken in some cases otherwise favorable. Yet this difficulty may generally be overcome by judicious management. If proper means are employed the endurance of the child will generally be sufficient. *But whatever else is done, or left undone, the courage of a child should never be broken down by overtaxing its endurance.* To do this practically ends the fight in failure. Precisely the same should be said of the nervous system of the child. These should be looked to with the greatest caution. Generally both may be maintained and the necessary operations properly performed, but not always. Cases will come to us in which this seems to me impossible. In such the cases must be tided along by palliative and temporary treatment at any risk until better conditions can be had. *One should never attempt permanent fillings under conditions which render perfect work impossible.*

The worst forms of cases that come to us are those in which caries has made such progress that the teeth are already practically out of use in mastication. In these cases the peridental membranes will be so sensitive to pressure as to render permanent operations impossible. There is no other course open but palliative and temporary treatment until full use of the teeth in the mastication of food is restored and the peridental membranes have recovered their normal condition. Nothing else than the full, free use of the teeth will restore the tone of their membranes. When this is accomplished and the teeth are again in full vigorous use, the operations should be proceeded with without delay. This applies to all patients, adults as well as children.

FLUCTUATIONS IN SUSCEPTIBILITY TO CARIES.

The acute observer of considerable experience may readily observe that in all of the milder types of the tendency to caries of the teeth fluctuations are occurring between susceptibility and immunity. Persons who have had a number of cavities develop and had them filled go on for a time, it may be for several years, with no new cavities starting, and then suddenly a new crop of cavities begins. This new susceptibility may continue for a time, and the patient will again show immunity. This may be repeated at intervals. I have noted this kind of fluctuation so frequently in my own practice that I feel that I cannot be mistaken about it. Also in the literature many cases have been cited in which persons have passed a number of years without new decays, when suddenly the teeth were found decaying rapidly. These I believe to be instances of the same fluctuations between susceptibility and immunity that I have myself observed.

A case in point is this: A little girl of fourteen had a number of cavities. These were filled, and during the next three years a number of new cavities occurred. Then immunity seemed established. No fillings failed, and no new decays occurred until she was twenty-eight. Then several new cavities occurred and two proximate fillings failed because the cavities had not been sufficiently extended. The next year two more cavities were found. Then there was complete immunity for ten years more, when suddenly there occurred another crop of cavities. This patient came regularly for examination during all of these years, and I feel assured of the meaning of this history. There are many such. In several cases I have seen caries occur first in middle life, the persons having been strictly immune throughout the period of childhood and youth. Still more rarely caries occurs first in old age.

These fluctuations are not dependent upon conditions affecting the general bodily health in any analysis that I have been able to make of the cases that have been under my care. Persons out of health are not especially liable to become susceptible to caries on that account. Persons in certain vocations are more liable to continuance of caries, as millers, candy-makers, and workers in starch or sugar. In the very nature of things, as well as in the light of physical examinations, these fluctuations between susceptibility and immunity cannot be from changes in the tissues of the teeth, for these are the hardest tissues of the body and the least subject to change. The whole range of facts bearing upon this question points to changes in the environment of the teeth, to the changes in the secretions, and possibly of the cellular elements of the general body which cause these changes. These changes in the secretions seem to have nothing in common with changes in the general health, and are not markedly influenced by them. They are often coincident with what seems to be the best of health. They are also frequently coincident with ill health, and many cases related in our literature would seem to connect them with ill health of sometimes one kind and sometimes another. These I have often seen, but, taking the mass of observations together, I am of the opinion that they are merely coincidences, and that there are no especial forms of ill health that particularly predispose the teeth to caries.

LOCAL IMMUNITY.

Local immunity from caries in mouths in which caries is progressing is constantly before us. When we take account of those positions upon the surfaces of the teeth where caries is liable to attack them, and in which we are constantly observing the attacks of caries, we see at once that there are widespread local immunities of regions in every mouth. In this case caries is destroying the bicuspids and molars, leaving the incisors untouched. In a second case the upper incisors are being destroyed, leaving the molars free. In many instances the proximate surfaces are attacked, while the buccal and labial surfaces are free from caries; while in a certain proportion of cases it is the buccal surfaces that suffer especially. Can this be on account of differences in the tissues of the teeth in these special localities? Is not the cause of this difference much more likely to be found in the environment of these particular localities, to something in the position that favors the building of microbic plaques in the one place and is unfavorable in the other?

Then, again, we find when we follow carefully the history of certain families that cavities in these several parts of the crowns of the teeth occur in succession, following each other as each particular group of positions becomes susceptible. In this family cavities occur in the proximate surfaces of the molars and bicuspids at the age of fourteen to eighteen, and in the same mouths we find a crop of cavities occurring in the buccal surfaces of the same teeth at the age of twenty to twenty-five. In another family the order of the occurrence of decay in these localities will be entirely different.

In persons who have no filling done, and in whom caries has not been very severe, we find that some certain teeth are lost, but that carious cavities in others cease to progress and remain stationary for many years or during life. Caries may even progress and destroy other teeth while these still remain stationary. The locality has become unfavorable to the progress of caries because of some change in its environment, and decay has ceased. This condition is very generally present in those cases in which very old leaky amalgam fillings have "*saved the teeth for forty years or more.*" If these fillings had fallen out five years after they were made the teeth would have been saved all the same, because of the immunity of the locality. Such fillings do not protect from caries when the susceptibility is at all considerable; and without careful consideration of their environment and comparison with what occurs in conditions of susceptibility to caries our clinical experience will lead to conclusions very wide from the facts.

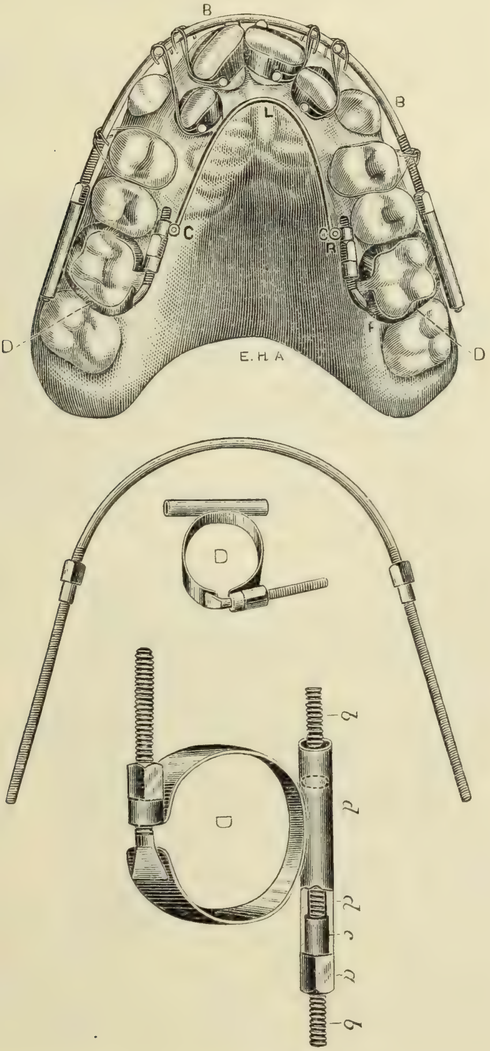
ORTHODONTIA.—NEW COMBINATIONS OF WELL-KNOWN FORMS OF APPLIANCES.

BY EDWARD H. ANGLE, M.D., D.D.S., ST. LOUIS, MO.

THE expansion arch, or what is improperly called "the long band," originated with Fauchard in 1728, and unquestionably marks the one greatest step in the history of orthodontia.

It was at first a flat piece of metal bent to conform to the general contour of the dental arch. Through numerous perforations fibrous ligatures secured it to the anchor teeth, as well as exerted pressure upon the malposed teeth.

FIG. I.



Although it was crude and "wobbly" in the beginning, it was destined to pass through many evolutionary stages at the hands of Bell, Fox, Harris, Schange, and others, and to finally become one of the most useful and universally employed of all regulating appliances.

The expansion arch possesses qualities which will probably always keep it easily in the lead of all other regulating appliances.

By its use we have control over the entire dental arch: over the teeth individually as well as collectively, in contradistinction to the vast number of appliances which have been devised to act locally, principally by reciprocal force upon the malposed teeth alone, and which by so acting usually effect displacement of others originally in correct position, so that these in turn require additional devices for their correction, etc.

Again, with the arch we have the greatest control over anchorage, being able to employ simple, reinforced, reciprocal, and even a certain amount of stationary anchorage, so that it is possible to concentrate upon one tooth the combined resistance of all the remaining teeth.

Finally, it is an ideal pattern to guide us in tooth-movement, and to which the dental arch is molded to conform, besides being a temporary retainer as well.

In the improved form, as here shown, Fig. 1, it is believed that its size, proportion, strength, and elasticity, as well as stability of anchorage and attachments, are probably very nearly perfect.

Without doubt the greatest improvement which it has received in recent years is the substitution of annealed brass wire ligatures, Nos. 26 and 28, for the long-used fibrous or elastic ligatures, which were uncleanly, admitted of slipping and stretching, and exerted only a moderate amount of pressure. With a proper quality of wire ligature there is no slipping or stretching, the power being direct and positive and the maximum amount of force easily exerted. Most valuable of all, these ligatures may be tightened without renewal by an additional twist of their united ends, thus really adding to the ligature that ideal power, the screw. So the range of application and usefulness of the arch has been greatly extended, and, as well, the time of treatment with its use has been reduced fully one-half.

The latest improvement to the arch is the extension flange or friction sleeve upon the nut, which fits with great accuracy into the sheath upon the clamp band D and effectually prevents the annoyance of the nut becoming loosened by the friction of tongue or cheek. At the same time longer thread and consequent greater strength is gained without increase of bulk.

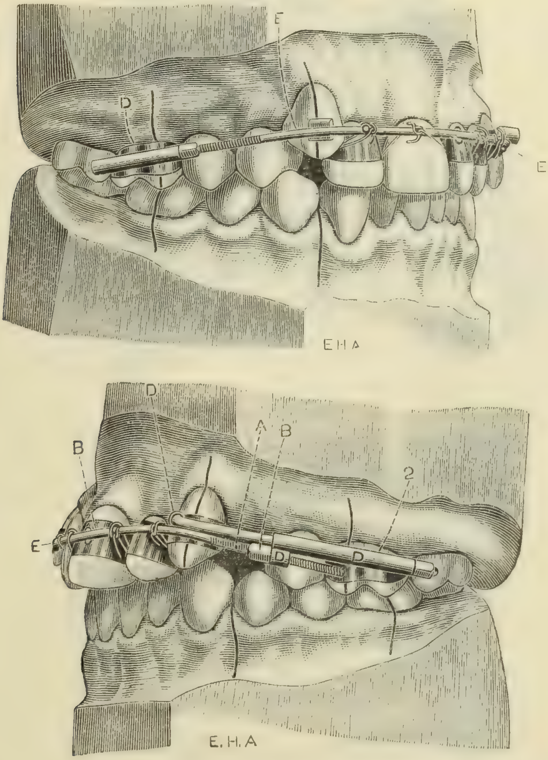
In the intelligent use of the arch the teeth may be moved *en masse;* either arch may be widened by moving outward one or both of its lateral halves, or either may be lengthened or enlarged in any portion in front or on one or both sides thereof. Elevation, depression, or rotation, labial, lingual, or mesial movements of individual teeth may be accomplished with certainty and under the best control.

But for the purpose of shortening the dental arch on one or both sides after extraction of a tooth, or in front by the moving inward of protruding teeth, or for the distal movement of individual teeth, the expansion arch by itself is unsuited and should never be employed; not that it lacks in power, for this is ample, but for the reason that displacement of the anchor teeth will follow, their resistance being insufficient to overcome that of the moving teeth.

It is the common experience of all that the combined resistance of the molars in simple anchorage is not equal to that of the cuspid alone. The molars are invariably tipped forward and the normal harmony of the occlusal planes, so necessary to maintain, is destroyed. A careful study of the alveolus and of the length of the roots and attachments of the teeth confirms common observation and practice on this point.

The difficulty of this movement, so frequently necessary, is successfully overcome by a combination of the expansion arch with the author's well-known device, the traction screw A and D, Fig. 2.

FIG. 2.*



The traction screw is adjusted for retraction of the cuspid first. The angle of the screw is made to engage a pipe soldered to a band encircling the cuspid, while the shaft of the screw passes backward through its sheath, which has been rigidly soldered to a screw-clamp band (No. 2) firmly clamped in cement upon the first molar. The retraction of the cuspid following tightening of the nut at the posterior end of the long sheath is easily effected, while tipping forward of the crown of the anchor tooth is impossible. It must be dragged bodily through the alveolus, if moved at all. (This form of anchorage is most efficient and valuable, and is known as stationary anchorage. It was first suggested by Dr. Barrett.)

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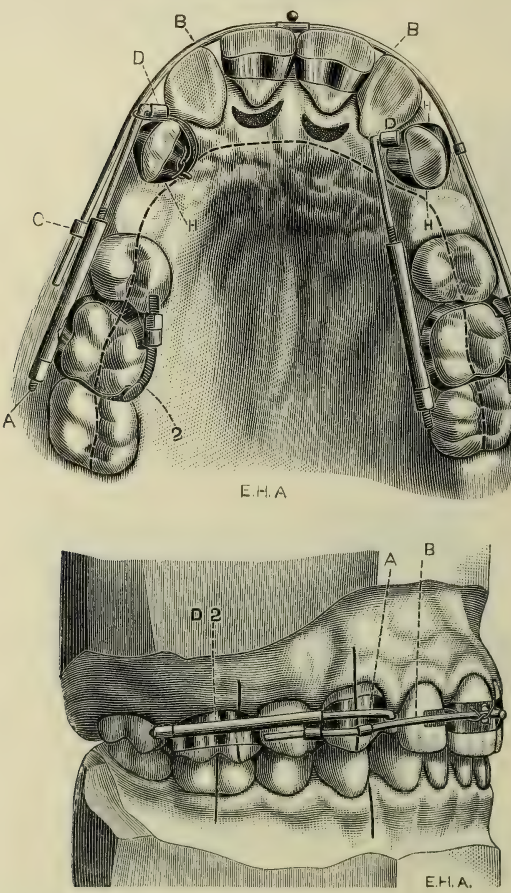
By combining the expansion arch with this appliance the movement of other teeth is easily carried on at the same time. The end of the arch is securely supported by being passed through a short tube previously soldered to the anterior end of the long sheath of the traction screw. Of course the same combination may be used on both sides if desirable. If not, the opposite end of the expansion arch is secured in the usual way in the sheath of the clamp-band D. The expansion arch is attached to the teeth to be moved by means of spurred bands and ligatures in the usual way.

Fig. 3.



It will be seen by studying this combination that we have reciprocal anchorage combined with stationary; in other words, the resistance to the force of the moving incisors is reacted to the molars, and helps to overcome the resistance of the retracting cuspid.

This is a most valuable combination, and with it the most perfect control of that very obstinate tooth, the cuspid, is gained.

A similar combination is extremely valuable in shortening the arch by retracting cuspids and protruding incisors after extraction of the first bicuspids, the force for retracting the incisors being received from some form of headgear upon the center of a plain threadless arch (arch B), the ends of which rest in tubes soldered to the ends of the long sheaths, as shown in Fig. 3, thus combining occipital and stationary anchorage. With its use we may shorten the time of treatment in these cases nearly one-half, and that, too, without displacement of the molar teeth, so important to avoid in all these cases.

CHAIRMAN'S ADDRESS, SECTION OF STOMATOLOGY, AMERICAN MEDICAL ASSOCIATION.

BY GEO. V. I. BROWN, D.D.S., M.D., C.M.,
Dean and Professor of Oral Surgery, Dental Department, Milwaukee Medical College.

Members of the Section on Stomatology: For the second time it is my privilege to give you a greeting in the time-honored form of the chairman's address. Properly you have the right to expect of me a *résumé* of the various evidences of progress in those directions in which our interests particularly are centered. A pursuance of this idea takes us directly to the pages of the journals published during the year. It is but natural that much of the matter which they contain should prove, upon close investigation, to be merely the old coats that various subjects have long been wearing turned the other way, fashioned over into a more modern form, perhaps edged and trimmed with something new; yet there have been new facts developed, or at least a new growth started, upon old lines of development, upon a few subjects which bring them rightfully to your notice at this time. Notable among these are the experiments of Dr. J. Leon Williams, whose demonstrations of his study have cast a new light upon the etiology of dental caries, and are bound to have an extended influence, directly and indirectly, upon the methods employed in the preservation of tooth-structure; as are also his studies of the pericementum, particularly those which by the aid of the microscope have shown the collateral nerve supply from which we find positively that nerve-filaments make their way to the pulp, not only through the apical foramen, but through the pericementum at other portions of the root surface.

It is the possible clinical importance of this interesting demonstration to which I feel that I must call your attention, bearing to me as it does a more than usual import through the study of the various phenomena of neural disturbances, which have made up the larger portion of my practical work for some time past. Last year and the year before also, in papers before this section, and in one before the Section on Neurology, I tried to make clear the fact that by reason of the action of the jaws through some central disturbance affecting the muscles of mastication by malocclusion, habit, or otherwise the constant irritation of the membrane around the roots frequently caused reflex pain in the various points of distribution of the fifth nerve; spasmodic and other affections frequently also, and symptoms of general neurasthenia which have hitherto usually been ascribed to eye-strain, womb affection, or some of the other better-known forms of nerve irritation. That such conditions might result from pulpitis or direct irritation, transmitted to the nerve trunk through the apical foramen, was well understood, but such symptoms were not commonly accepted as being likely to arise from the pericementum alone; yet, from the slides which Dr. Williams has shown, the facility with which they might occur in this manner is easily comprehended. The importance of the work, and the diagnostic significance of the facts made clear, I am sure will become more and more apparent to others as it has to me during the investigation of the past year, which by a long list of clinical evidences has added to my already strong conviction that the frequency and severity of the symptoms in nervous affections of the face, jaws, head, and neck are nearly always, if not induced, at least aggravated by the constant grinding of the teeth or extreme pressure of the jaws during sleep or moments of abstraction, and with paroxysms of pain, usually, however, without consciousness of the fact by the individual at the moment. The symptomatology and diagnostic differentiation of pains of the head and face are most unreliably laid down in text-books and medical literature, therefore any step toward definite etiological distinction is worthy of our most careful consideration.

The second subject brings to mind the fact that there has begun and is now in the somewhat painful and even uncertain act of being born a new state of things with regard to the higher preliminary requirements for the admission of students to our dental colleges. Also an effort to arouse interest in the unification of the laws governing the practice of dentistry throughout each of the different states, so that a license to practice granted by one board shall be everywhere accepted by other boards, and this, too, without lowering the standard or in any way jeopardizing the good work which even the strictest among them may be endeavoring to accomplish. This subject has been brought forward by Dr. E. C. Kirk in a valuable paper and editorial. It is unfortunate that at the present time there appears to be a danger of a clashing of interests between the National Board of Dental Examiners and the National Association of Dental Faculties, the two bodies whose interests should be, and doubtless are, centered in raising the standard of dental education; forces that ought to be in harmony instead of in opposition to each other, or vying in an endeavor to advance rather than disputing as to the manner of the progress.

It seems to me that the dream which many of us have cherished in those moments when our Utopian fancies have held sway over the difficulties that at other times seemed insurmountable might now be accomplished, or at least set well on its way toward fulfillment, by a little effort, which might perhaps in a measure help to solve the present differences. By way of suggestion to this end, the idea is given now to you that were the two associations named to work together, approximately at least, in harmony, as do the upper and lower houses of Congress, the legislatures and senates in our states, and agree that rules governing college management, with regard to preliminary requirements, nature and length of study, requirements for graduation, etc., should be acted upon by each and approved by both before becoming laws properly binding the college membership; and, this much accomplished, that these two bodies together should select each a certain number yearly from among themselves or outside of their membership who should be empowered to examine both colleges and students and report jointly to both associations; also to regulate the examination methods and questions of the different boards, so that students graduating under this supervision might be everywhere accepted with merely a nominal examination or none at all, and that a license granted by one board could be then accepted with perfect security by every other board, because the character of the questions would be uniformly the same for all. Thus we have at once a simple and feasible plan, easily practicable and without the necessary revision of state laws or the passage of a national law, both of which are almost or nearly insurmountable obstacles.

The arguments against this plan might be upon the one hand that the National Board of Examiners is a body the members of which are largely more or less the result of political appointment, and therefore objectionable on the ground of politics, and perhaps of unfitness as compared with the members of the Association of Faculties, who are necessarily trained teachers, thoroughly conversant with the needs and practical requirements of college work. Yet out of this very objection grows the particular practicability of the plan, because the training and fitness of the college men, by action and advice, would undoubtedly influence the other body, while, on the other hand, any tendency to check advance by reason of the possibility of any selfish interest, expressing itself through a fear of the loss of students, would be counterbalanced by counsel with the examiners' association; and, while it must be admitted that the *personnel* of state boards is often marked by ignorance and unfitness for the duties they are called upon to assume, yet it must be remembered that they represent the people and voice the sentiment of the great body of practicing dentists not enrolled upon the faculty lists of colleges, whose earnest desire, so far as the best of their number might dictate, would unquestionably be in the direction of an elevated standard; and while individual dishonesty may sometimes be a bar sinister upon the escutcheon of a board, yet who can question that the majority of the delegates from each of all the states would at least be fair-minded, honest, and full of the zeal which every high-thinking practitioner should possess? Why not then join hands,—those who are fit by reason of experience and whose calling ought to lead them to favor better education, with those who have been selected by reason of their inclination in the same direction? Without politics, delay, or serious discord, without injury to the interests of any college, board, state, or individual, can be set in motion a systematic co-operation which would give us a higher standard of dental education, the equivalent of uniform legislation. I would suggest that this idea, if you approve it, emanate in some substantial form through co-operative committee or direct communication to both the National Association of Dental Examiners and the National Association of Dental Faculties.

Two years ago in Philadelphia, in the chairman's address of Dr. Andrews, and again last year in my own at Denver, the idea was brought forth and stress laid upon the importance of examination of the mouths of public school children by competent dentists, and the need of giving instruction as to the proper care and such prophylactic measures as would at least tend to check the vast amount of suffering, sickness, and general infection due to the pathogenic organisms of the oral cavity, neglected through the ignorance which prevails upon this subject. I feel it my duty to again call your attention to the importance of this subject, and to impress upon you the need of some active step in a direction which is clearly defined and directly in the line of duty, which rests upon each one of us much more, by reason of our double interests in medicine and dentistry, than it does upon the dentist alone, who has perhaps less concern with regard to the public health.

It is a fact that fifty per cent. of all people, certainly in the large cities, are affected with tuberculosis in some of its many forms. It is also true that the death of one of every seven by this disease is a conservative estimate. We know that affections of the stomach and of the intestinal tract throughout its entire length are commonly the result of infection from the mouth. We know that the bacillus of diphtheria, the pneumococcus, streptococcus, and other pathogenic germs are frequently found in the mouths of healthy persons; that diseases of the eye, ear, nose, and throat, anemia, pyemia, and septicemia, together with many spasmodic and nervous diseases, are often the result of oral conditions that with a little care might easily have prevented them in the beginning. You are all too familiar with these facts to need a rehearsal of them; but what I feel is required this time is some active definite organization which will begin a systematic undertaking of the promulgation of this idea and the work it contemplates in all of the cities where our influence extends. In no other way can we confer so much benefit upon the two professions we represent and upon our fellow-men, or reflect such undying credit upon ourselves and our section, as by giving this matter the time and consideration it deserves. I would suggest therefore that a committee be appointed and empowered to appoint sub-committees in the various cities to ask state local societies to assist and to correspond with the principals of schools, urging that the dentists whom this committee might select be allowed, or, if necessary, requested, to come to the school buildings and talk to the scholars upon this subject; that whoever undertakes this work be urged to make examinations of the mouths and collect data as far as possible. If all this be done in the name of this Section of Stomatology and the credit resulting be laid to its door, I am sure the reward will be ample.

I have forborne thus far making mention of the value of papers of members of our section published in current literature, or of additions from individuals among our little band of followers in book form, valuable to dental, medical, and general science, choosing rather to refer to contributions from outside our membership; but I cannot in justice refrain from calling attention to the fact that the Section of Stomatology has reason to be proud of the scientific results of original investigations that its members have given to the world, there being no other organization of dentists, so far, at least, as I can learn, whose members have contributed so much scientific matter in the form of books, papers, and original work in proportion to the total membership as have the members of this section.

This I believe should be not only a matter of congratulation, but one of great encouragement as well. It is a matter that makes me feel deeply the honor you have twice conferred upon me, an honor that, optimistic as I am of the future of this section in which our hearts are bound together, I feel and know will be of ever-increasing importance in the eyes of the scientific world.

THE RELATIVE TOXICITY OF COCAIN AND EUCAIN.*

BY A. H. PECK, M.D., D.D.S.,

PROFESSOR OF MATERIA MEDICA, THERAPEUTICS, AND SPECIAL PATHOLOGY IN NORTHWESTERN UNIVERSITY DENTAL SCHOOL, CHICAGO.

(Read before the Section on Stomatology, American Medical Association, June 6, 1899.)

COCAIN hydrochlorate is a white crystalline alkaloid obtained from the leaves of the *Erythroxylon coca*, a small shrub of Peru and other Western South American countries. Its extensive use as a local anesthetic is so familiar to all that repetition is here unnecessary. It is not my intention in this paper to especially refer to its anesthetic properties, but only to its toxic effects relatively with those of eucain, as observed in actual practice and as determined by original experimentation.

Eucain is a colorless crystalline powder of German production, and was placed on the market some years ago as an anesthetic to be used in a similar manner to cocain. It was soon observed that the first product, or that which is now called "alpha eucain," produced many undesirable and some very disagreeable effects, so much so that its use was soon largely discontinued. In February, 1897, Dr. Silex, of Berlin, brought forward a new substance, called Eucain "B," that it might be distinguished from the first, or Eucain "A." These substances are now termed,—the first product Alpha Eucain, and the second Beta Eucain. The use of alpha eucain has been almost entirely discontinued, and it is no longer furnished by the dealers, unless especially designated in the order. Beta eucain is said to be a chlorhydrate of benzoylvinyldiacetonalkamin.

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Were the action of these drugs as anesthetics always unattended with disagreeable, and, as is sometimes the case, alarming symptoms, both of local and systemic character, they would be to the dental and medical professions one of the greatest boons of the present century. Many minor surgical operations, both in general and dental practice, could, by the aid of these drugs, be performed with equally good results and with greater facility than without their use. Unfortunately, cocain is in its action one of the most inconstant and unreliable drugs in the whole Pharmacopœia. It will always produce anesthesia, if properly used, and also frequently produces poisonous symptoms, ofttimes alarming. If a certain quantity of arsenic or morphin, or almost any other known poison, be used under certain circumstances, the resulting symptoms are nearly always the same; we know what to expect. It is unfortunate that the same cannot be said of the action of cocain. I have often seen the most alarming symptoms of systemic poisoning result from the use of a certain quantity of cocain, while in other individuals a like amount under seemingly the same conditions produces no bad symptoms. There is no other drug in the whole realm of medicine in connection with the action of which individuals vary so much in point of susceptibility. I have seen all the stereotyped symptoms of systemic cocain poisoning result from the use, in a pulp-canal, of a small quantity of a one per cent. solution, while again I have seen injected into individuals twenty minims of a two per cent. solution, and this being repeated as high as four times without poisonous symptoms resulting, so varying is the susceptibility of individuals to the action of the drug.

I cannot pass on without calling your attention to the fact that I as firmly believe that cocain produces, in some, local poisoning as well as systemic poisoning, notwithstanding the fact that many disagree with this statement. I have seen from the subcutaneous use of cocain, for the extraction of one root of a tooth, three good teeth lost, with extensive destruction of the alveolar plates of bone, together with extensive sloughing of the soft parts, and all this in the absence of any systemic symptoms. Some, no doubt, will say this is the result of infection by an unclean syringe. But how is it to be proven that this is the case? The work has been done under the most careful antiseptic precautions. I have seen so many cases of local poisoning in varying degrees result from the use of this drug that I am forced to the belief that it possesses local as well as systemic toxic properties.

As to eucain "B," there is much to be said in its favor as compared with cocain. During the past year I have frequently used it in practice for devitalizing pulps, for local applications, and by injection, and have as yet observed no evil effects of note. Eucain, however, is not capable of producing the same degree of anesthesia under like circumstances as is cocain. This has been proven beyond the possibility of a doubt by the experiments I have made. As this paper is to deal only with the toxic properties of these drugs, I will not here discuss their anesthetic properties.

Last year, while experimenting extensively with the essential oils, using guinea-pigs largely, I did some work with cocain and eucain, enough to demonstrate that there was an interesting field in contrasting the two. Since then I have experimented extensively with these agents, using guinea-pigs.

How completely is the statement that cocain varies much in its action demonstrated and proved to be correct by the following experiments, the first one serving to exhibit the poisonous propensities of the drug, and this, too, in the absence of any marked anesthetic effect: A pig, weight eight and one-half ounces, into which was injected twenty minims of a two per cent. solution of cocain, which amount represents three-twentieths of one grain, after the lapse of eight minutes showed some indications of anesthesia, but these were comparatively insignificant. For the next six minutes various symptoms of distress were exhibited, such as a general spasmodic, jerky action of all the muscles of the body, accompanied with evidences of pain. At the end of fourteen minutes its hind legs were partially paralyzed, and one minute later it fell on its side completely overcome. Its head was firmly drawn back, all the muscles of its body being rigid; this condition would, at short intervals, give way to a distressful spasmodic action, general in its scope, and thus these sets of symptoms continued to alternate for a period of five minutes. During these twenty minutes the animal was not anesthetized to any appreciable extent, responding vigorously to a prick of the needle at any portion of the body. The heart action at first was somewhat depressed, but soon recovered, and thereafter its contractions were strong and rapid, evidently being much stimulated. The respiratory organs, at first slightly stimulated, were very soon depressed, and remained so until recovery set in. After twenty minutes it began to recover, and at the end of twenty-five minutes could stand on its feet; however, could not walk without falling. At the expiration of forty minutes recovery was far advanced. This experiment shows the toxic action of the drug with the absence of anesthetic effect better than any other on my list. While the poisonous propensities of this drug are frequently manifested, they are usually accompanied with anesthesia.

The following experiment shows in just as interesting and decided a manner the anesthetic action of the drug to the exclusion of nearly all manifestations of poisonous symptoms: Weight of pig, eight and one-half ounces; twenty minims of a two per cent. solution of cocain were injected at 10.15½ P.M.; at 10.25 general anesthesia was quite marked, there being little response to the prick of a needle, and when placed on its back the animal could hardly regain its feet. The heart action was somewhat depressed. At 10.27 it fell to its side, the heart action being now about normal; respiration somewhat shallow and quick. At 10.37½ it regained its feet and occasionally evinced a desire to run away, its heart action now being strong and rapid and respiration normal. At 10.46½ ten minims more were injected, this making in all nine-fortieths of one grain. The side in which the second injection was made almost immediately became swollen, as if considerable edema was induced. This has been noted by others and forms the basis of the claim of some that local sloughing is only due to infection of the products of edema, which have infiltrated the tissues, liquefaction or pus-formation taking place and sloughing finally resulting. This is no doubt true ofttimes. Up to 10.56 the pig remained on its feet, and for the last five minutes preceding would walk about, prick up its ears, look up and chirp, and in various other ways gave evidence of enjoying a period of that intense beatitude and inner joyousness, while a succession of visions and phantasmagoria, most brilliant in color and form, trooped rapidly before the eyes,—as related in Wood in connection with the experience of Montegazza while under the influence of this drug. Occasionally it would make a sudden rush, as if impelled by a plenitude of physical power, such as also took possession of Montegazza at various times. At 10.56, symptoms of general anesthesia were quite marked, a condition of general relaxation rapidly developing. At 11 it became unconscious and sank to the table on its side. Immediately after the second injection the heart action was noticeably depressed, but quickly revived and became exaggerated over the normal. The respiratory apparatus was somewhat depressed most of the time. At 11.03 there occurred a slight general spasmodic action of all the muscles, the head being slightly drawn back; this was accompanied with a feeble cry, as if in slight pain. Action of the heart was strong and rapid; the breathing quick and shallow; true tetanus of various muscles was observed. This endured only an instant, all the muscles becoming perfectly relaxed as before. Thus the animal continued in a state of perfect general anesthesia. At 11.06 action of the heart became feeble and respiration scarcely noticeable. At 11.12½ the animal was apparently dead; respiration and the heart action both ceased. Thus it lay for thirty seconds; at 11.13 a faint gasp was observed, followed quickly by a second and third. The heart began to beat feebly, and in another two minutes, or at 11.15, the heart was beating regularly, but not so rapidly as normal; the respiratory apparatus was working regularly, but not strongly. Thus the animal remained in a perfect state of general anesthesia for twenty-three minutes, or until 11.38, when signs of recovery were observed. It was then placed in its box, and in the morning was found to be as bright and lively as its mates.

The behavior of other pigs under the influence of cocain has, in some instances, approached the behavior of this one, but no other has been so typical. This, in connection with the results of all my experiments in this particular, to my mind, effectually settles the question of the inconstancy of the action of cocain.

Let us now study the action of Beta Eucain under similar circumstances.

Twenty minims of a two per cent. solution of Beta Eucain, or three-twentieths of one grain, were injected into a pig of eight and one-half ounces weight. At the expiration of thirteen minutes slight evidence of anesthesia,—or perhaps better said, the action was that of a mild hypnotic, the animal appearing somewhat drowsy, at the same time all reflexes responded to any interference by way of pricking. The action of the heart and respiratory apparatus was slightly depressed. Three minutes later recovery commenced, and at the expiration of twenty minutes the effects of the drug had largely passed away. Two minutes later another twenty minims, or six-twentieths of one grain in all, were injected. Five minutes later slight evidence of nausea was observed; at nine minutes the hypnotic action was more marked and was accompanied with slight evidence of true anesthesia. Its hind parts were somewhat paralyzed, and the reflexes slightly blunted. The heart action and respiration were more depressed than at first. At eighteen minutes it began to recover, and at the expiration of twenty-five minutes, or forty-seven minutes from the time of first injection, was able to walk about. One minute later, or forty-eight minutes from the time of the first injection, a third injection of twenty minims, making nine-twentieths of one grain in all, was made. Five minutes later nausea developed and the animal seemed much distressed thereby. The heart action and respiration, being at first stimulated, soon became much depressed; after ten minutes twitching of all muscles of the body, spasmodic in character, developed; this condition increased until, at the expiration of eighteen minutes, the animal fell to the table completely exhausted. Its head was firmly drawn back, all the muscles being at high tension; rapid winking of the eyes continued, with gasping for breath and twitching of ears. For the next twenty minutes this condition continued, with violent tetanoid spasms of all muscles following one another in rapid succession, each spasm being accompanied with mournful squealing, which seemed to indicate much distress and pain. At no time were the reflexes, either plantar or cremasteric, lost; neither was there much evidence of general anesthesia; indeed, the entire action seemed to be more that of a paralyzer than of an anesthetizer. The heart action and the respiratory apparatus were much depressed. At times the heart-beat was almost indiscernible, and the animal would gasp distressingly for breath. At the expiration of this twenty minutes signs of recovery developed, and at the expiration of twelve minutes more it could stand on its feet, but could not walk without toppling over. It was now very late, and the animal was placed in its box, and in the morning was found to be none the worse for its experience. This case is interesting in that it seems to prove conclusively that at least three times the quantity of Beta Eucain is required to produce virtually the same degree of toxicity as is produced by cocain. These results, or this action of the two drugs, as related in this experiment and the first one with cocain, I regard as bearing directly on their toxic properties.

In a pamphlet issued by Schering & Lane, of New York, who are sole agents for eucain in the United States and Canada, is made this statement,—that Legrand and Joanin, like Silex and Schmidt, have proved that one and one-fifth grains of cocain are necessary to cause death of a guinea-pig of two and one-fifth pounds weight, and that four and five-eighths grains of Beta Eucain are necessary to cause death of a pig of the same weight. I have been unable to secure pigs as heavy as this, the heaviest I have had weighing twenty-six and a half ounces. Taking their figures as a basis and reckoning a fatal dose for a pig of less weight, in direct ratio therewith, it would require five-sixths of one grain of cocain to cause death of a pig weighing twenty-four ounces, and of Beta Eucain two and four-sevenths grains would be necessary. Let me say, in this connection, that this manner of determining a fatal dose for a pig of a given weight is not a safe one to follow in dealing with pigs of less than twenty-four to twenty-five ounces weight. My experiments seem to prove conclusively that the ratio of a fatal dose of these drugs decreases rapidly in proportion to the decrease in weight and age of the animal.

In my work five-sevenths of one grain of cocain proved the limit as a fatal dose for a pig of twenty-four and one-half ounces weight. The symptoms manifested in this case were not in any essential particular different from those occasioned by a non-fatal toxic dose, which symptoms have already been described, except that at times they were all exaggerated, and especially was this noticeable in connection with the heart. After the brief depression of this organ which occurred at first, its action became greatly exaggerated, at times violently thumping, especially as the end drew near and the respiratory apparatus became more depressed. Death occurred at the expiration of nineteen minutes by paralysis of the muscles of respiration, the heart continuing to beat feebly and irregularly for thirty seconds after breathing ceased.

The violent action of the heart above referred to seemed to be more an effort on the part of the animal economy to supply the needed oxygen to the system through the medium of the circulation, during the period of respiratory depression, than the result of direct stimulation by the drug.

The difference of susceptibility of these animals to this drug is striking. In one instance one-half of one grain proved fatal to a female pig of twenty-five and one-half ounces weight, while in another instance a male pig of sixteen and one-half ounces weight survived the effects of a like quantity. However, on the whole, I think the sex makes very little, if any, difference in the action of these drugs. The above fatal dose for a pig of the given weight has been determined after many experiments with pigs of different weights, and with different quantities of the drug. The same also is true in connection with Beta and Alpha Eucain.

Of Beta Eucain two and two-sevenths grains are necessary to cause death of a pig of twenty-four and one-half ounces weight. In this experiment death occurred in thirty-two and three-quarter minutes from the time of injection. The symptoms were not unlike those already described in connection with the use of this agent, except that, as in the case of fatality by cocain, they were greatly exaggerated. At no time were evidences of anesthesia marked, nor were the reflexes entirely lost. The action of the heart and the respiratory apparatus was depressed after a brief period of stimulation at first. When violent spasms occurred the heart action would be temporarily stimulated. Death occurred from paralysis of the muscles of respiration and of the heart, breathing and the heart action ceasing at the same time.

Alpha Eucain has proved to be virtually on a par with cocain as to toxic properties. Five-sixths of one grain is the limit as to fatal action with pigs of twenty-five and one-quarter ounces weight. I injected this amount of Alpha Eucain into a pig of this weight, and at the expiration of seven minutes trembling of all its muscles occurred; at nine minutes its head drooped, with nose to the table; at eleven and one-half minutes the animal suddenly fell to its side, and was seized with violent spasms; its heart action and respiration were temporarily increased, being very soon thereafter much depressed; nausea and some vomiting occurred; the drug also acted as a diuretic, renal discharge occurring quite freely; severe spasmodic contraction of all muscles followed one another in rapid succession, and were invariably accompanied with evidences of pain more or less severe. Death occurred at the expiration of eighteen minutes by paralysis of the muscles of respiration and of the heart, breathing and the heart action ceasing at the same time.

It is also stated in the pamphlet above referred to that cocain cannot be sterilized by boiling, and that if subjected to a temperature of 176° F. it is transformed into ecgonin, a substance devoid of all analgesic power; also that boiling does not in any degree affect the efficiency of eucain. I have demonstrated this statement regarding eucain to be true, but if it be true regarding cocain my experiments in this connection are in error. According to them, it is shown conclusively that boiling does not destroy the potency of this drug, but does modify it somewhat. I prepared a two per cent. solution of cocain and also of eucain. These I subjected to a bath of boiling water for five minutes. These solutions were allowed to cool gradually, after which twenty minims of the cocain solution were injected into a pig of eight and one-half ounces weight, with the following result: At the expiration of seven minutes all its muscles were in a tremor, and at ten minutes control of its hind parts was lost; at eleven minutes it fell to the table completely overcome. The symptoms which followed were the same as in other cases, except they were less violent. At the expiration of thirty minutes the animal had apparently recovered.

Into another pig of eight and one-half ounces weight were injected twenty minims of the boiled two per cent. solution of Beta Eucain. No symptoms of note followed this injection, with the exception that the hind parts were for a time somewhat paralyzed. At the expiration of twenty-two minutes a second injection of twenty minims was made. The symptoms following were virtually the same as those which followed the second injection of the other case as related above. At the expiration of forty-five minutes after the second injection, recovery was well advanced. A third injection of twenty minims was now made; the symptoms which followed were identical with, and somewhat intensified over, those of the other case related above. At the expiration of forty-six minutes after the third injection, the animal had nearly recovered.

To recapitulate, my experiments lead me to conclude as follows:

1. The action of cocain is inconstant; one never knows whether the symptoms occasioned by like quantities of the drug, in animals or individuals, under like circumstances, will be similar or dissimilar.
2. The action of eucain is constant. The symptoms occasioned by the use of like quantities in animals under like circumstances, and, so far as my experience has gone, in different individuals also, are the same.
3. That the first action of cocain on the heart is that of a depressant, and on the respiration is that of a mild stimulant; the after-effects being, on the heart, that of a decided stimulant, and on the respiration that of a decided depressant.
4. That the first action of eucain on both the heart and respiration is that of a stimulant, the after-effects being that of a decided depressant.
5. That cocain causes death in animals by paralyzing the muscles of the respiratory apparatus, the heart's action continuing in a feeble way for a brief period after breathing ceases.
6. That eucain causes death in animals by paralyzing the muscles of the heart and of the respiratory apparatus, they ceasing to operate simultaneously.
7. That eucain in toxic doses nearly always causes nausea and occasionally vomiting.
8. That cocain is much less nauseating and scarcely ever causes vomiting.
9. That eucain is decidedly a diuretic, causing renal discharge in a majority of instances in which a toxic dose is used.
10. That cocain is not a diuretic to any appreciable extent, renal discharge having occurred in only one instance in connection with all my experiments.
11. That the pupils of the eyes in nearly all cases of cocain poisoning do not respond to light and are more or less bulging from their sockets.
12. That the pupils of the eyes in most cases of eucain poisoning do respond feebly to light, and rarely ever bulge from their sockets.
13. That the action of toxic doses of eucain is more like that of a paralyzing, tetanoiding, convulsion-producing agent than it is like an anesthetizing one, the plantar and cremasteric reflexes nearly always responding.
14. That toxic doses of cocain cause general anesthesia in connection with the other symptoms in the majority of cases.
15. That tetanus of all striped muscles of the limbs, and Cheyne-Stokes breathing nearly always occur with the use of cocain, but seldom does either occur when eucain is used.
16. That cocain is at least three times more toxic than Beta Eucain, and that Alpha Eucain is as toxic as cocain.
17. That boiling does not destroy the efficacy of cocain, but that it does modify it, and that boiling in no degree lessens the efficiency of eucain.

The above deductions were made only after many experiments in connection with each individual point. I have observed in my work many interesting features in connection with the relative worth of these drugs as local anesthetics, but this paper is not to treat of this phase of the work. There is much experimental work yet to be done in this connection, the results of which I shall be pleased to present at some future meeting.

THE ROENTGEN ENERGY TO-DAY.

BY JOHN DENNIS, ROCHESTER, N. Y.

(**Read** before the Seventh District Dental Society of the State of New York, April 25, 1899.)

THE topic which has been assigned to me by your committee is pregnant. Two years ago, almost this very evening, I had the honor of addressing your society on the then new Roentgen energy, so new, indeed, that but few of its features had been fairly scanned; so new that many of the theories then entertained were of necessity tentative.

To-night, after the lapse of these twenty-four months, I come before you again on an invitation to talk to you a little while on "The Roentgen Energy To-day." I shall not undertake to-night to detail all of the progress which has been made in the science of the Roentgen energy during these two years. Many of the tentative theories which prevailed then have stood the breakdown test of practical experience; others have been relegated to the realm of dreamland. While many questions remain unanswered, much which then seemed mysterious has been made plain. Now, as then, we are still in the dark regarding the exact nature of the force, although much that it will accomplish has been ascertained. At the same time it is only the new disciple of the art, proud in the possession of his powerful new apparatus, who will undertake a definite determination of the nature of this still terribly mysterious force. Those who have gone most deeply into its study are prone to qualify their opinions, and will candidly admit that they are open to conviction on many important points.

The science of the Roentgen energy,—for it is now conceded to rank as a science,—while not advancing so rapidly as some of its early devotees had hoped and dreamed, has taken its place in the world's work; it is fulfilling its mission. The advance in appliances by which the force is generated has been slow, but constant and healthful.

There is little to be said in regard to the angles of the force. I am aware that some of my contentions regarding the origin of the lines of force have been controverted. At the same time I shall, I trust, be pardoned for saying that my most recent investigations fortify me in the statement made two years ago, and even then demonstrated by photographs, that the lines of the Roentgen force, when once generated, make straight toward infinity, that they cannot be perceptibly deflected, although the magnet will change and distort the cathode rays within the vacuum tube. I allude to this branch of the subject because it is one in which I have been specially interested, and because it goes to the integrity of every fluoroscopic observation and every reproduction of the Roentgen shadow on the sensitive plate.

There is one portion of my subject which I have approached with great reluctance, and if I should thrust aside conviction of responsibility I should stop right here; but, as our Methodist friends sometimes say, it is time somebody "spoke out in meeting."

Possibly, if not probably, some of you who listened to my paper two years ago will recall my words of warning regarding the use of the Roentgen energy upon living human subjects; at all events, I will venture to recall them myself. At that time I had advanced far enough in my modest researches on the lines of the Roentgen energy to be convinced that an energy so potent and so penetrating had powers for evil which should not be ignored. The two years which have intervened have confirmed and strengthened me in the position then assumed. My experiments even then had satisfied me that, while this potent energy had come to us "with healing on its wings," it should be generated intelligently and cautiously, or not generated. If you will again pardon a personal allusion, I would like to say that the rules for the generation of the Roentgen energy which I had at that time formulated for my own guidance have enabled me to avoid untoward results in the not few exposures which I have made. In all of my experiments and exposures for surgical purposes I have never yet caused the slightest symptom of tissue degeneration or even discoloration of the surface.

During the past few weeks, and indeed months, I have been devoting much study to this question of injurious effects following the generation of the Roentgen energy, and have reached certain conclusions based upon those investigations. It is my candid judgment that the time has now arrived when the abuse of this God-given energy should be controlled; that its use should be circumscribed, and that no living human being should be subjected to the Roentgen energy excepting by those who have established their competence to use it with absolute safety. I am aware that this contention will not pass unchallenged; that it will be maintained in certain quarters that any one with intelligence enough to turn a switch is qualified to operate appliances in the generation of a force which the most accomplished scientists in Europe regard with caution; but I am a newspaper man by instinct, training, and life-long occupation, and the fact that any position which I assume after mature deliberation and full investigation may be assailed does not necessarily cause me to abandon it.

I shall not attempt to-night to treat in detail all of the evidence which goes to prove that in this Roentgen energy, or in the appliances by which it is generated, there lurks a subtle, little-understood danger. Men who are most familiar with the phenomena are the most cautious and circumspect in their methods of manipulation. In the low-toned, mellow light of the vacuum tube there is little to suggest caution to the novice. It is only when one fully realizes that he is handling electricity at enormous pressure and, in Ruhmkorff coil practice at least, very liberal volume that the suggestion of caution masters him. I have sought diligently, and sought in vain, for a determinate answer to many questions regarding the therapeutic effect of differing currents of electricity upon the human system. Yet we cannot shunt the fact that some of these effects, under certain conditions, are not only injurious, but fatal.

Even to-day, after so much attention has been given to the subject, authorities differ widely as to the exact cause of injuries resulting from the improper use of the Roentgen energy, for no injury results from its proper use. Numerous theories have been advanced, and scarcely a week passes without a new suggestion. In the course of the experiments I have carried on recently I have confirmed, at least to my own satisfaction, the theory which I first advanced two years ago: that the injurious effects result not from the Roentgen energy itself, but from a diversion of a portion of the electric force utilized in its generation. I have found that when the tube is placed nearer the person than the distance between the cathode and anti-cathode of the tube we have, in a more or less marked degree, the tingling sensation noticeable in certain therapeutic appliances. This sensation becomes more distinct when the tube is placed still closer to the person. I was led to suspect, therefore, that a portion of the current in the leads to the tubes is diverted to the person, and that this diverted current, long applied, produces more or less inflammation. The experiments I have referred to seem to verify this suspicion. The theory at one time stoutly affirmed, that the Roentgen energy itself carries deleterious substances, and possibly microbes, into the tissue seems not to be tenable; at all events, the injuries, so far as determined, seem to be strictly local, and do not present features of blood-poisoning. Again, cases of injury are unknown when the tube is maintained at the proper distance from the patient, even when long exposures have been made. This would seem to successfully controvert the theory that microbes from the clothing are carried into the tissue.

In view of these facts, I have reached the conclusion that proper limits should be placed upon the use of the Roentgen energy in cases where human beings are involved. I want to make my contention in this behalf so plain that there can be no misunderstanding here or elsewhere as to its exact meaning. My proposition is this: That a state commission be appointed, after necessary legislation, consisting of a technical expert in Roentgen energy, two members who shall be physicians and surgeons of high professional standing in their respective schools, and at the same time experienced Roentgen-energy operators, and a practical electrician. It would be the duty of this commission to examine all persons desiring to utilize the Roentgen energy in its application to human subjects, and to license such as are found to possess the required qualifications, and such only; persons using the Roentgen energy upon human subjects without such examination and license to be subject to punishment as for a misdemeanor.

Some one will ask why all this caution if the Roentgen energy is so valuable to humanity. I lay down the principle unreservedly that the Roentgen force as produced to-day is safe in the hands of experts, and safe only in the hands of experts. In this I do not vary from the position assumed by me in addressing this honorable body two years ago. I am not just now going into all of the reasons which fortify me in this position; life is too short. However, cases are not lacking of deleterious effects where the energy has been generated by incompetent operators, and where such untoward results would have been avoided had the operator been seized of the commonest known principles which govern the force. It is not necessary on this occasion or for present purposes to multiply instances of reckless use of a powerful force by men who by their methods of manipulation show that they are—how shall I say?—inexpert. In one of the two instances of severe injury the operator had been warned, having in mind his appliance, never to make a time exposure on a human subject with the tube closer to the person than from twelve to fourteen inches. That same rule is one which I adopted in my own work immediately after I took up the study of the energy. Sometimes, for one reason or another, I have failed to accomplish such perfect definition as was desired, but I have rigidly adhered to the rules I originally devised, and I see no reason now to depart from them.

I hold that it is a crime for a Roentgen-force operator to injure a subject. I know that this sounds a bit harsh, but it is nevertheless my candid, matured judgment. It would, I fancy, be a crime for me to enter one of your dental offices in your absence and administer chloroform to one of your patients with the risk of injurious or perhaps fatal results which might wait upon my ignorance of the proper use of anesthetics. It would be a crime for me to go to the prescription desk and administer a fatal portion or even a harmful portion of morphin or atropin or belladonna, or any of the drugs which in competent, trained—shall I say licensed?—hands are productive of remedial results.

Do you ask if I would include surgeons, dental surgeons, physicians, and college professors in this rigid examination? Certainly. I would absolutely make no exceptions. Until a man had shown to the satisfaction of a competent commission that he was skilled in the use of the appliances, he should be barred from exposing human subjects to the force.

Have you ever made a critical examination of the large eight- and ten-plate static machines and fourteen-inch coils in vogue to-day? I have thrown a skein of sparks over a sixteen-inch air-gap with one of these huge influence machines, and it requires eight amperes with a pressure at the primary of fourteen volts to throw a fat spark ten inches between the terminals of a Ruhmkorff coil. These are powerful electric generators, simple as they appear. It is not my province to make any suggestions regarding the therapeutic use of electricity by means of these powerful appliances. It is only when the Crookes tube is connected into the spark-gap and the Roentgen energy ignorantly applied to the human subject that I venture to enter my protest.

Unpopular, do you say? Unquestionably! Any man will be unpopular, as the term is used, if he raises his voice against any wrong, whether it be the sale of filled cheese or the misuse of electrical appliances, if that protest runs counter to the interest of the Juggernaut of modern "business," before which the most sacred interests of humanity must humbly bow. All the same, as a modest investigator of some of the mysteries of "the thing called electricity," as one who has had much opportunity to note the abuses to which the Roentgen energy is subject, and as one who accepts the entire responsibility for his utterances, I sound the note of warning. If this great humanitarian science is to fulfill that which I believe to be its mission, to alleviate human suffering and save human life, there must be thrown about it at least as much restraint as is applied to the apothecary who mixes a seidlitz powder or pours out an ounce of syrup of ipecac.

I am not greatly troubled regarding the reception which this radical proposition will meet, so far as I am personally concerned. My life has been devoted to a profession which is not especially noted for moral cowardice on the part of its devotees. If I have spoken earnestly and candidly it is because my convictions in this behalf are deep-seated, and because I am in the presence of earnest, candid professional men.

But there are bright side-lights to the picture. At no time in the brief history of the art has it had devotees who are more conscientious. The initial stage of curiosity has passed with the genuine investigator, and researches are now along certain well-defined lines. The reform of which I have but imperfectly spoken may not come speedily, but it will come; and when it is ushered in—speed the day!—the science of Roentgen force will begin its really beneficent career in earnest.

RESTORING BADLY BROKEN-DOWN MOLARS AND BICUSPIDS TO USEFULNESS.

BY A. RETTER, D.D.S., UTICA, N. Y.

(Read before the Dental Society of the State of New York, May 10, 1899.)

With considerable hesitation I accepted the honor of reading an essay before this society, knowing that among its members are many better qualified to do so than myself. The best I can do is to take up a practical part of dentistry, such as presents itself almost daily in a busy practice. For instance, a molar with a large posterior approximal cavity extending far below the gum, with either a foul pulp or an exposed live pulp, which has ached or is at the time aching, the tooth already filled in one or more places; the party thus presenting himself anxious to save it, willing to pay a reasonable fee within the limits of his plain circumstances. Here is more of a problem than appears at first glance.

In a large city practice of millionaires, where the fee is no consideration, the dentist is enabled to go to any trouble to get the best result, but unfortunately the large mass of the people, including most dentists, are not millionaires, or even possessed of large means. The store clerk, the mechanic, and many others in plain circumstances are as much to be looked after by the profession as the fewer wealthy class. In cities of fifty thousand or twenty thousand and less population the plain class of people form the bulk of a dental practice, and treatment and method need to be such that the dental organs of the masses are saved and results obtained satisfactory to the patient and to the pocket of the operator.

My observations in many mouths where teeth thus broken down were treated and filled or crowned has convinced me of the utter temporary nature of the results obtained, which, in a large majority of cases, consisted in the shell breaking down, crumbling to pieces, accompanied by an abscess and the final extraction of the tooth in a very few years. Its ruin, however, is sometimes prolonged for a short time by the forcing of a gold crown away below the gums over the half-treated and badly trimmed stump in a vain endeavor to grasp it deep down enough to give strength to the concern, with the general result of a deep irritation to the gums and the accumulation of food and decay under the overhanging edges of the crown below the gums, at which place I have seldom found a crown properly adapted, its only purpose being to hide from the patient the foulness and decay going on beneath.

For the past few years I have followed a method of treating and filling this class of teeth which has given me such good and such comparatively permanent results that I take this opportunity to present it for discussion and criticism.

It is impossible to lay down more than a general course of procedure. The treatment of each case may vary, according to its peculiarities, but in general, whether the pulp be foul or has to be freshly extirpated, the proceeding is about the same. The first effort is always to get rid of the contents of the root-canals. Wherever possible the rubber-dam is adjusted, and where necessary a temporary wall of wax and gutta-percha built. The details of this familiar operation I omit for the sake of briefness. Sulfuric acid treatment is then resorted to. In lower molars the anterior canals, and in upper molars the labial canals, are sometimes so small that only the finest Donaldson nerve hook will enter them. It is for this reason that a temporary wall is built to restore the broken one, so as to be enabled to place a few drops of sulfuric acid into the pulp-chamber and pump it with the fine broach clear to the end of the canal. Some of it may occasionally pass through the end, but it has in my practice never caused more than a slight soreness. This treatment is followed by the usual neutralizing with bicarbonate of soda, washing out thoroughly.

Next comes the drilling out of the root-canals. This to many is easier said than done. However, with practice a skill is soon acquired which will surprise any one who will take the pains to try how quickly, easily, and safely it can be done if done by hand, commencing with a larger sized Gates-Glidden or Morey drill, and sometimes with Dr. Williams's root reamer, followed by the smaller sizes as required, the aim being to reach the end of the canal. Often I am successful, but sometimes in the very fine canals I do not get quite to the end. I go as far as I can safely. The trouble which might result from leaving a short end not drilled is discounted by a little treatment before drilling into these fine canals. I take a fine broach and moisten it just enough so that finely pulverized nitrate of silver will cling to it; this I work into these canals clear to the end, care being taken not to bring it in contact with the walls of the tooth, and then take my chances on the drilling, stopping when sensitiveness makes it prudent to do so. The aim is to drill the canals as thoroughly as possible, removing all soft or disintegrated tissue which in any manner might be susceptible to decomposition or give a poor foundation for cutting a thread to receive a screw. The canal is then enlarged or finished to the proper or desired size by a Gates bur. Of these I have enough sizes to correspond with a set of taps and dies and with Nos. 12 to 18 of U. S. wire gauge. These burs being supplied only with handles, I had them cut off and adjusted, so as to be able to use them in a little chuck worked by the thumb and finger.

A thread is cut into the canal with a suitable tap, and on the corresponding wire with the die. I have been using hard platinum, but of late have used Ash & Sons' alloy, which can be obtained in sizes of U. S. standard gauge. The drilling of the canal is often carried to such an extent that a bicuspid root, or even a molar root, will sometimes receive a screw cut out of Nos. 12, 13, or 14 wire U. S. standard. The taps I have had also cut off and arranged so they can be worked in any part of the mouth. The screw, when cut, is placed between two blocks of wood and a thin groove cut into its entire length the depth of the thread.

The roots being now ready to receive the screw, the further treatment varies somewhat, according to the success achieved in drilling the canals and other peculiarities of the case. In roots drilled to the end I pack cotton steeped in oil of cinnamon or oil of cloves. In roots where the end has not been reached I place at the bottom of the drilled portion a little cotton moistened slightly and dipped in powdered nitrate of silver, and then seal up the tooth and wait a few days or a week. The drilled portion of the root facilitates the placing of the medicaments and the pickling and impregnation of what remains of it. The nitrate of silver sometimes causes slight soreness, but I seldom have a case where it does not disappear in a few days. Of course, it is not necessary to pack a large quantity; a little will go a long way, and overtreatment must be guarded against. Should the soreness be of a very severe nature I reopen the tooth and pack with oil of cinnamon in which some crystals of cocain are crushed, and I have yet to see the first case in which the soreness did not disappear in a very short time. If a blind abscess is suspected I proceed in precisely the same way. I have had cases where there existed for more than a year a large, hard swelling over the root of a molar or bicuspid with no established fistula, but under this treatment it subsided entirely. Should, however, a fistula appear subsequently I take a fine broach, wrap a little strand of cotton around it, moisten very slightly, dip in pulverized nitrate of silver, and with it wipe out the entire tract of the fistula, and rarely do I have to apply it a second time; it will almost always heal readily, and seldom appears again; that is, where the roots have been previously treated as stated.

Of course, there may result some pain from this treatment, and especially if too large a quantity is used; as already stated, a little will go a great way. As a rule I find my patients willing to undergo a little punishment if the result justifies it. In extreme cases of soreness and pain a topical application to the gums, consisting of ether and alcohol in which are dissolved menthol crystals and a few crystals of cocain, will give almost immediate relief, and is far more effective than a dozen boxes of pepper plasters. It is a most valuable application in any kind of pain, whether such pain is the result of extracting a tooth or the setting of a crown or bridge, or other pericemental inflammation. It is applied on little plasters made of rubber cloth on one side and felting cloth on the other, stuck together by means of gum-tissue, which is obtainable at any rubber store. The felt side is moistened with two or three drops of the solution and applied to the gums; the solution is renewed once in a while. A one-dram bottleful and a couple of the pads is all the patient requires.

It need hardly be mentioned here that whenever the proper medication can be forced through root and fistula it should be done. For this purpose I use hydrogen dioxid, and follow it up with oil of cloves. Circumstances vary the treatment, and one rule will not fit all cases. Common sense is quite a factor in the treatment of these teeth. I have little use for a large assortment of so-called antiseptics; those mentioned answer every purpose.

At the second sitting, which usually follows a week later, the shell is prepared. I need hardly mention here that for the purpose of gaining access to the root-canals all tooth portions in the way of such access were previously removed, and all preparation of the shell left consists in cutting away weak edges, beveling and shortening weak walls, so that the filling-material will protect them. In bicuspids especially I cut away quite a portion of the palatal wall to be covered or rebuilt with amalgam to receive the blow of mastication against the filling-material and screw. Sometimes a hole is drilled through a wall and a small screw inserted through it for the amalgam to pack around it. No one rule can be laid down for all cases. The screws are now put in place. The canals are, of course, first dried in the usual manner, then a little cement, to which is added about twenty per cent. of powdered hydronaphthol, is mixed to proper consistence. This is worked into the canal; the screws are also covered with it, and then screwed into place, the groove in the screw permitting the escape of the excess of cement. Only a small quantity of cement is required. The open ends of all canals are always first closed with a small bit of pink gutta-percha. Without waiting for the cement to set, the amalgam is packed around the screws, care being taken to push the surplus cement against the labial walls, especially so in a bicuspid, so as to prevent as much as possible the discoloration that amalgam might bring. Contour is always practiced, the screws holding the amalgam so well in place that plenty of time may be taken to build against the adjoining teeth and at the same time trim the cervical edge, and thus prevent the pushing and crowding of the material below the gums. At a subsequent short sitting the filling is polished.

But, now, what is the advantage gained by setting screws in the manner indicated? It is that the thorough drilling of the roots for the reception of the screws combines treatment with the mechanical part of the operation. It cleans out the root in the most efficient manner, disposing of the infected portions, and if a little should remain at the end it is easier reached and impregnated with a disinfectant and preservative. If a sewer is stopped up with foul matter, crowding it with disinfectants and leaving the matter in place will not remedy the evil; a thorough flushing and removal of the contents is the only permanent remedy. Thus the time spent in preparing for screws is saved by shortening the treatment.

But why not simply set a screw into the root in cement without cutting a thread into the canal? The reason lies in its giving greater strength, and it saves the use of a large quantity of cement, which latter is not antiseptic and prone to corruption. By using the thread a very small quantity of cement answers the purpose, and one-fourth of hydronaphthol can safely be added, since the strength of the cement is not all-important. In fact, an antiseptic balsam might answer the purpose as well, simply to make a moisture-tight joint.

One or two screws thus set possess remarkable strength, and will hold a properly prepared shell together for many years, and after thus having given good service the tooth is still ready to receive a crown when the shell has finally crumbled; and will then again be a much better foundation for a better crown than could possibly be placed if no screws had been used. On such a stump a crown can be fitted perfectly just to the gum line without the least danger of crown and shell breaking off together.

While personally I always have had, and still do have, great faith in crown- and bridge-work, yet experience has taught me not to be blind to their faults, but rather try to overcome them. Of all the gold crowns that I ever had to remove for one cause or another, and some of them from operators of the best repute, I have yet to find one that did not smell foul, and whenever I take one off I silently pray that I may be exempted from ever having to wear one of these glittering pests. Do not understand me to be opposed to crown-work, but I am opposed to its abuse. To merely crowd a foul canal with disinfectants, fill the shell with cement or amalgam, and then force a gold crown over all away down below the gums with overhanging edges is producing a condition of foulness which ought to entitle a patient to a suit for damages. Dental hygiene will yet have a day of reckoning with crown- and bridge-work as mostly done at present. Many broken-down molars or bicuspids can be filled and rendered useful for many years if screws are properly placed, and are then in the very best of condition for the crown, which should be the last resort. A healthy, strong foundation should always be the first condition to be brought about; upon that the structure may be built as circumstances require.

In conclusion, I wish to add that I do not save every tooth thus treated, but where I formerly had grave apprehensions as to the final result in the care of this class of teeth I now take them in hand without fear, and can honestly say that I make a success of a larger proportion than I ever did before. The dentist who saves every tooth, regardless of its condition, lives only in dental conventions.

PROFESSIONAL EDUCATION AND ETHICS.

BY A. E. BALDWIN, M.D., LL.D., D.D.S., CHICAGO, ILL.

(Read before the Section on Stomatology, American Medical Association, June 6, 1899.)

MR. PRESIDENT AND GENTLEMEN,—In presenting this subject to you to-day I am not unmindful of the fact that the subject is large, and one that affects the interests of not only the profession (or our branch of it) especially, but even more the interests of all those who are put under our charge.

The importance of it has grown upon me each year for many years, and I have always been attracted to anything that I have found in print pertaining to it; to my mind, however, the most vital point is seldom or never touched upon, and it seems to me that now, when our schools are almost universally demanding a course of three or four years, as well as considerable attention to a preliminary education, the time is ripe to call attention to an absence in this teaching of some things that are of vital importance to the practitioner and to those who patronize him. May I not be allowed to here and now enter a plea for the merging of the two subjects of the paper into one?—for the education is not and cannot be complete without very great attention being given to the part of the education called "Ethics," whose meaning is, "The science of right conduct and character; a system of principles and rules concerning moral obligations and regard for the rights of others." Why should not this be regarded as important as any part of the so-called education? Without it our young graduates will not be able to enter into their duties as professional men with a proper education,—for we should consider that our duty to our patrons consists in more than an effort to place their money in our pockets in as great quantities and for as little service as possible. We owe to the public the duty of exemplifying the aforesaid definition of ethics. How can we expect this matter to be regarded as in the least vital to our graduates when the teaching is so deficient pertaining to these duties? To be sure, they are hard to specifically define in individual cases, but throughout them all are certain well-defined principles of equity and justice which are apparently absent from the training of the mind and the hands of a youth in these years of student life. Might I not go a step farther and say that there are many things taught in our professional colleges by both precept and example that exert a very baneful influence on the moral element of the student? And it is a fact well known to us all that should a teacher attempt to teach one thing and then do the opposite, the good of the attempted teaching is not only *nil*, but a lesson is drawn by the pupil that is not, to state it mildly, in the line of ethics proper.

In this matter of education I should speak of the lack of encouragement, in many, indeed most of our schools, of original work in microscopical and bacteriological investigation, in order to aid in determining the exact place occupied by the much talked-of microbes and bacteria. There are many things in regard to oral troubles that are as yet uncertain, and these students may, if encouraged and helped while attending college, give us much light as to causes and results; they may be able to show us that in many instances these organisms are present to assist nature in alleviation, or may clearly show us facts new to us concerning their ravages. I am constrained to say that there is reason to fear that we have arrived at conclusions oftentimes that are unwarranted in the light of to-day; or, in other words, many of our conclusions are reached without a sufficient grounding in facts. Illustrating this, we may call to mind a teacher in one of our schools that has brought before the profession scores, and probably hundreds, of remedies, each one more wonderful than the last; and many of them would never be recommended or used if a little more time was taken by him and others in proving their worth ere shouting their almost specific virtues.

I do not want to do any injustice to teacher or school; my effort is simply to call attention to a few of these shortcomings with the hope that it may result in bringing others to recognize these truths, and that in time a change may be brought about in the character of the instruction given in colleges, offices, and societies.

Why do we not demand that the standard of our department of the profession be raised? Is not the reason this, that we do not practice true ethics ourselves and with our patrons? Are we all, and at all times, careful to advise our patients just what we should want to be advised were we in their place? Are we sure that we have not at times advised and done operations that would have been better done in some other way?

This matter of ethics is much written about and descanted upon not only in our specialty, but also among the general practitioners, with the result that while in many instances the letter of ethical laws may be followed, the spirit of these laws has been entirely ignored. There may be, and probably is, no need of my illustrating this, as many examples will be readily called to mind by each of you.

Some years ago I visited a neighboring dentist, and while there he prepared the cavity and filled a tooth for a patient, and when about ready to introduce the filling he asked me to examine the cavity. I did so, and at the same time glanced about the mouth and discovered there were several teeth that had cavities in them. After the patient stepped out I asked him if he had not noticed them, and he said he had, but he had learned that the best policy was to do only the work asked for, and then he could get a good price therefor, and would still escape the charge of being a high-priced dentist. What an example of ethics, or rather of unethical practice! How little of the golden rule was shown in the transaction! Another example: A so-called reputable dentist advised me not to use tin and gold for a filling-material, although admitting that it was an excellent material; his reason was that one could just as well get patrons to let you use gold, and by so doing get larger fees. Another example: Upon some very faulty work of a neighbor coming to my attention, I quietly visited him and called his attention to the faulty conditions which obtained. He replied that for the pay he received he could not afford to do it any better, apparently forgetting that if he did the work at all he could not afford to do anything less than the very best in his power.

I might cite such examples for an hour, but I think this will suffice to show a lack of information as to our duties to those put under our charge and the moral responsibility resting upon us as professional men.

Should we not, as the guardians of those placed or falling under our charge, take time to advise them in every way in our power as to conditions present, causes therefor, and, as far as we can, how to avoid them in the future? All who recognize its importance should gladly give all the time necessary to instruction in all ways possible in all that pertains to proper care of the teeth and their accessories.

There is an old saying: "A stream can never rise above its source," and in this matter we cannot expect the young graduate (unless he had great breadth and strength of character) to rise superior to the moral tone of his "Alma Mater," and this paper is intended to call attention to a few of the many ways in which college teaching is lacking in moral tone, both directly and indirectly. In the first place, the force of teaching should be addressed, in the main, to an endeavor to instruct students how best to serve the patron; to have them feel when they are patronized that the position they occupy is one involving a responsibility either as to advice or in regard to services to be performed; that deceit has no place in their office, and that in all things that come to them they should as far as possible "put themselves in the other's place" and carefully advise accordingly. In the mind of the student his teacher represents all that is of the highest type of a professional man, and, as said earlier in the paper, if his words, or "oral" teachings, are good and thoroughly in accord with true ethics, and if then the student learns that while the college is advertising to do work for those who cannot afford to have it done at a private office, this work to be done at the college at the bare cost of material, and that this college accepts all who come without regard to ability or inability to pay proper office fees, and then charges for the gold used seventy-five cents or one dollar per sheet for gold marked three dollars, but which is made by order of the college for only about two dollars or two dollars and a half, it will not take that student long to determine that, so far as the management of that college is concerned, the moral lesson to be drawn is that the professional duty is to practice deceit and literally "prey" upon the public and fleece them at every opportunity. When his teacher shows him a large occlusal cavity in a tooth where there remains very little but the enamel-walls after the cavity is prepared, and advises him to fill such a cavity with a mass of gold, then, as any one who is a metallurgist and also knows the brittleness of the enamel when not underlaid with dentin will know, in so doing he is doing worse than the thief, for he has not only taken his money for doing him harm, but has weakened his faith in the profession at large.

May it not be a serious question, when an anterior tooth is broken down badly, where there are large distal and mesial cavities, and the instructor, seeing a fine chance for making or putting in fillings which in their neatness are at least temporarily a monument of his mechanical skill, that the student, when his patron comes to him with similar conditions, will be influenced to try to reproduce the same kind of temporary monuments that his teacher did?—with the result of obtaining quite a quantity of the patron's ducats, though the patron soon learns through the almost certain failure of the work that his interests would have been better and much more permanently served had the tooth been treated to a nicely adjusted porcelain crown, which work would have been less conspicuous, less expensive, and much more durable than the other. And the same thing would doubtless be true of the work done by his teacher as well.

Should not the instruction in the college course tend to broaden the character of the student, so that even when his patron wants work of an expensive character done and is willing to pay for it, but which the dentist knows would be less serviceable than work done by a much less expensive method, he should stand firm in recommending that which his honest professional judgment leads him to believe is for the patron's interests? Take the case evidenced by some filthy catch-all of a bridge being adjusted instead of a clean and well-constructed plate.

I hope no one will understand me as condemning all bridges, for that is farthest from my thoughts; for I consider that, in the proper place and of proper construction and adjustment, nothing is more beneficial than the bridge. The practitioner should sink himself and, if necessary, his technical skill, in trying for the permanent interests of his patron.

Should not the student be instructed, by example as well as by precept, by his teacher that he should gladly take some time each day if necessary to give advice as to care of the mouth and teeth, and this many times without any direct recompense? Should we not realize that we are here for a broader purpose in life than to gauge everything that we do by a direct money value? Should not our young men learn that they should be as ready to freely advise how patrons can prevent trouble in the mouth often by care or preventive means as to repair the abnormal conditions that obtain and for which the patients come? The teacher should realize his responsibilities and honor his position instead of depending on his position honoring him.

We cannot ignore the fact that the instructors in our institutions of learning (many of them at least without an idea probably of the far-reaching influence on the moral development and character of the student) are guilty of practices that are demoralizing, and even might be classed as unethical and dishonest. I could cite many instances illustrative of this, but I will mention only one or two: A professor in one of these educational institutions compelled all of the students who took his examination (and it was necessary that all the graduating class should take it) to have purchased and have in their possession a certain book and certain instrument, informing them that he had no interest in the sale of the same, either financial or otherwise, when the fact was that he had a contract with the publisher and manufacturer and was at the time collecting royalty on each book or instrument sold. How long can such a teacher hold the respect of his students? and, what is worse, who can say how much this example may develop of the unethical in their professional career?

Should we not all endeavor to "speed the day" when especially all the teachers and teaching in our schools will not only endeavor to give correct instruction in the technique of the work, but will exert an entirely healthful moral influence, and one that will help to make large-caliber and broad-minded men,—men who will not allow themselves to be dwarfs or pursue dwarfish methods?

NOVELTIES IN PROSTHETIC DENTISTRY.

BY R. M. SANGER, D.D.S., EAST ORANGE, N. J.

(Read before the Dental Society of the State of New York, May 10, 1899.)

No one of the many new devices which have been added to the paraphernalia of the prosthetic dentist in recent years has seemed to fill the proverbial "long-felt want" as completely as the electric furnace. Now that we have added to that the line of high-fusing bodies of definite colors, from which we can select, as we would teeth from a shade ring, the exact color desired, we have a well-nigh perfect outfit with which to meet easily some of the perplexing questions which confront us in connection with crown- and bridge-work. Of the various uses to which I have put this outfit, I have selected two for your consideration, not because of any originality, but in the hope that they may prove new and helpful to some of my hearers.

In placing all-porcelain crowns on the incisor teeth, the difficulty of making a perfect joint has led to the introduction of several devices of doubtful utility. I believe the following method has come nearer solving the problem, at a less cost of time and labor, than any that has yet come under my personal observation.

Let us assume, for the purpose of illustration, that an incisor, the crown of which is two-thirds gone, is to be replaced with a porcelain crown. The canal being properly prepared and partially filled, the tooth is trimmed down on the labial side with an Ottolengui root-facer at an angle of about forty-five degrees, to a point well under the festoon of the gum; it is then trimmed with the same instrument at the same angle on the palatal side flush with the gum, giving the appearance of a wedge with the labial side a little deeper than the lingual. A Logan crown is selected of the required color and width, the length being sufficient without grinding. A piece of very soft platinum foil is then carefully burnished over the end of the root, leaving plenty of surplus antero-posteriorly, and as much as possible on the sides. The center is perforated for the passage of the pin and the platinum is laid aside.

The properly colored body is mixed to the consistence of thick cream and carefully worked into the recess of the crown about the pin until it is overfull. The platinum is then placed on the root, care being taken to get it into exact position, and the crown pushed home in much the same manner as when cementing it fast. This forces out the water and leaves the body almost dry. A little bibulous paper is passed around the edge to take up the water, and with a fine camel's-hair brush the surplus body is removed, and the tooth, body, and platinum withdrawn intact. These are placed at the entrance to the furnace for about two minutes to complete the drying, then carried to the center and the heat raised until the porcelain is fused, when it is shut off and the piece allowed to cool.

The whole process of baking and cooling takes about ten minutes. The work is tried in the mouth to be sure nothing has been disturbed, and then if there has been any appreciable shrinkage, which is unusual, the loss is made up by painting on a little more body with a camel's-hair pencil and baking the piece again. When cool the platinum is readily stripped from the porcelain with a pair of operating pliers, and we have a perfect-fitting V-joint, which is universally recognized as the most desirable.

The detail of cementing the crown in place is familiar to all, and needs no description here.

Badly decayed roots, with one side gone far down below the gum-margin and the canal enlarged by decay to a cone shape, and yet with sufficient strength to carry a crown, if it could be accurately fitted and fastened, often present themselves for our consideration. The edges remaining above the gum are cut down with a facing instrument far enough to conceal the joint, and the canal is cleansed and prepared for the reception of the pin.

A piece of soft platinum foil is rolled into the shape of a cornucopia and placed as far up in the canal as possible, and allowed to extend well down beyond the gum-line. It is then packed nearly full of cotton or bibulous paper, which forces it against the walls of the canal, and while the cotton and platinum are held in position with a hand plugger the protruding portion of the platinum is burnished over the edges of the root and gum and shaped to restore the contour of the root where it is broken down. The cotton is then withdrawn, the platinum cornucopia removed, and the flaps soldered with pure gold. A piece of 18-gauge square platino-iridium wire about one-third longer than the platinum shell is filed to a point, placed in the cornucopia, and caught at the apex with a little pure gold solder. The piece is again placed in the root in order that the pin may be given the desired direction without bending the platinum shell. It is then removed, filled with body flush to the edge, and baked. The overlapping platinum is carefully cut away and the piece put back in the root. We now have a perfect-fitting dowel with a shoulder extending out to the margin of the gum sufficiently to admit of the attachment of a crown. A cross-pin facing having long pins is selected and set in position on the dowel in the mouth, and the pins bent around the protruding post, much after the manner of the How crown. The whole is removed, built up with porcelain on the palatal side, and baked. This usually requires to be done twice where so large a quantity of body is used. The piece is now ready to be cemented in the usual way.

Note that in this case the platinum foil is not stripped off, but remains as a part of the pin, and, being slightly serrated with the sharp blade of a penknife and completely filling the canal, the minimum quantity of cement is required, making the strongest hold it is possible to obtain.

One of the greatest bugbears to the crown- and bridge-worker is the fracturing of the porcelain facing after the bridge or crown has been set, ofttimes necessitating the removal and partial destruction of the remainder of the work in order to repair the otherwise slight damage. Dr. Bryant, of Washington, introduced an admirable method of replacing these facings in the mouth by cutting threads on the pins, drilling and countersinking holes in the backing, and screwing on beveled gold nuts from the palatal surface. The principal objections to this method are the difficulty of drilling the holes for the pins in a proper position to make a perfect joint, the danger of fracturing the facing by too much pressure in screwing it home, and the necessity of always using cross-pin teeth, which in my opinion never should be used for facings (unless the closeness of the bite makes it absolutely necessary, which is unusual), as the pins in these teeth, being set side by side, leave the minimum amount of porcelain where strength is most required; whereas the straight-pin teeth—the teeth usually being longer than they are wide—admit of the pins being set farther apart and the maximum amount of porcelain placed where it is most needed. In order to overcome the objections to Dr. Bryant's method, the following procedure is recommended: A straight-pin tooth is selected and backed with 26-gauge gold or platinum plate, the holes in the backing are deeply countersunk, the pins cut nearly flush with the backing, and the tooth with the backing on, but not fastened, ground to fit the piece. They are then removed, and the cutting-edge held against the flat side of a stone and ground square across. A flat piece of gold plate is then fitted to the cutting-edge and allowed to extend a little beyond all the margins. Twenty-two-carat solder is flowed over one surface of this in sufficient quantity to form the cusp. It is then placed in position on the tooth, waxed fast to the backing, and the two removed, soldered together, replaced on the facing, the edges ground flush, and the cusp formed. The facing is then laid aside, and the backing, with cusp attached, is placed in position on the piece in the mouth and a hole drilled through the backing and piece from without inward; the hole in the backing is countersunk in the surface next to the porcelain facing, and a threaded gold wire, the same size as the drill, is passed to place and fastened to the backing with a drop of sticky wax. It is then removed from the mouth and soldered in position on the backing, the surplus of pin and solder are ground away to allow the porcelain to go to place, the porcelain is placed in position on the backing, the pins riveted and, after investment, soldered fast. As the threaded pin fits the hole in the piece tightly, the serrating of the sides of the hole with a wheel bur to give a cling to the cement is all that is necessary, and the simple cementing of the piece with a creamy oxyphosphate of zinc gives all the hold required. The grinding off of the protruding pin after the cement is hard reinforces this, however, by upsetting the thread and forming a slight rivet, and you can if you choose add a beveled nut after the Bryant method, but I have yet to record a failure without this. The method of forming the cusp here described was introduced by Dr. Finney, of Baltimore, and is as applicable to the original work as to the repair, as it practically eliminates all danger of fracturing the porcelain in soldering.

TREATMENT OF PULPLESS TEETH BY IODOFORM FUMES UNDER PRESSURE.

BY C. V. VIGNES, D.D.S., NEW ORLEANS, LA.

(Read before the Southern Branch of the National Dental Association, February 10, 1899.)

THE treatment of pulpless teeth with the fumes of iodoform under pressure had its origin and was first practiced in 1891 by Dr. John C. Blair, then demonstrator of operative dentistry at the Louisville College of Dentistry. It was used by himself and the students at college in over fifteen hundred cases during the time that I was there, and only two failures in obtaining the usual good results were recorded against it during that time.

Iodoform is sublimated at a temperature of about 240 degrees F.,—*i.e.,* it passes directly into vapor, which, upon cooling, condenses again into iodoform less a small percentage of iodin that is set free, and which, being a strong disinfectant and antiseptic and being also very penetrating when in its vapor state, especially so when under pressure, goes to every part of the tooth under treatment, even into the tubuli of the dentin, disinfecting and rendering perfectly aseptic every portion of the tooth with which it comes in contact; and the iodoform crystallizing against the walls of the root-canal up to the apical foramen, gives further assurance of asepsis.

To obtain the vapor and the pressure required to force it into the pulp-chamber and root-canal, Dr. Blair devised an instrument probably seen and used by many of those present.

It is very simple of construction, consisting only of a chamber to put the iodoform crystals and a rubber valve attached, to press the vapor when generated by heat through a needle-shaped tube into the diseased tooth.

For convenience, I have divided pulpless teeth under three heads:

1. Those containing a dead pulp that has given no trouble.
2. Those having a fistulous opening through the gums.
3. What is commonly known as blind abscess.

In the first heading mentioned, that containing an apparently harmless dead pulp, apply the rubber-dam, or use any other method to keep the tooth dry, then make an opening into the pulp-chamber just large enough to insert the point of the needle of this instrument, and after heating the iodoform chamber over the alcohol lamp until by slight pressure of the bulb a thin vapor is emitted, place the end of the needle in the opening of the tooth and by pressure on the bulb force the vapor into the pulp-chamber. Use the instrument for five or six seconds, open up your cavity, and you will find that the vapor has penetrated the pulp-chamber and root-canal.

Then you may clean out the canal, use the instrument again, and proceed to fill immediately and be sure of no after-trouble.

In teeth under heading No. 2, that is with a fistulous opening, use the instrument as before mentioned, and try to pass the vapor through the tooth out of the fistulous opening.

If you succeed in doing this (and you can in most cases) one treatment is enough, and you can go on and fill the tooth even if there is slight inflammation of the gums and surrounding tissues.

In cases which would come under my third division, that is where you suspect a blind abscess, the treatment is the same, but I would not advise immediate filling. Use some temporary stopping and have the patient return in two or three days, when you can treat again and fill at the same sitting.

Again, I will point two instances where the use of iodoform in this manner is very effective.

1. Where you fail after repeated attempts to remove all of the pulp from the root-canal, you can so desiccate and encase the remaining portion in iodoform as to render it inoffensive and make it form part of the root-filling.

2. You can fill with a solid deposit of iodoform the very small root-canals better in this manner than you can with any other material, and this done, you have an ideal root-filling—one that is together impermeable and antiseptic.

There is, however, one slight objection to this method of treatment, and that is the disagreeable odor of the burning iodoform. To obviate this, I used, at the suggestion of Dr. Montgomery, of Chicago, equal parts of ground coffee and iodoform, but found that while I destroyed in a marked manner the offensive odor, I failed to obtain the happy results that I had without the coffee. The fumes with the coffee become laden with carbon, lose their penetrating character, and cannot then be forced into the small root-canals, or even, after a time, through the needle of the vaporizer.

Now, in treating teeth in this manner, three rules should be followed:

1. Always keep the tooth under treatment in a perfectly dry condition.
2. Never attempt to pass a broach or any other instrument up the root-canal before first applying the vapor.
3. Don't use too much heat in generating the vapor, for this will liberate more iodin than is wanted, which will discolor the tooth and necessitate the use of hypersulfate of soda to remove the discoloration.

Thus it will be seen that in a few minutes you can accomplish with certainty what requires patience and sometimes several weeks of tedious work to do by any other method.

I know that the claims I make for this method of treatment are very broad, and that they seem too good to be true, but I have all faith in it. For nine years I have had unvarying success with it, and I am sure that if there are any other methods as good (and I doubt it) there are none better.

THE SYSTEMATIC TREATMENT OF DECIDUOUS TEETH.

BY J. W. COWAN, D.D.S., M.D.S., GENESEO, N. Y.

(Read before the Union Meeting in Baltimore, June 4, 1898.)

WE will first consider the treatment of the teeth of that class of juvenile patients whose parents have unreservedly placed them in our charge. The first step should be a concise lecture to the mother upon correct dental hygïene, that she may be able intelligently to put into practice the duties devolving upon her.

It is advised that about a month before the first tooth is expected to be erupted the gums be given a thorough massaging three times daily, that the child may become accustomed to having its mouth operated upon before the inflammation accompanying eruption has manifested itself. If this practice is carefully followed, it will very rarely be necessary to resort to lancing.

As soon as the first tooth has appeared, the process of keeping it free from deposits is commenced. This is accomplished with a short section of nursing-bottle tubing, drawn over the end of a piece of orange-wood, allowing the rubber to project about three-sixteenths of an inch, used much in the same way as we use a rubber cap on a mandrel, excepting of course the motion is simply a hand motion instead of a rotary one. This instrument will very effectually clean the incisors and cuspids on their labial surfaces. The approximal surfaces must be as thoroughly cleaned with silk floss, or, what is better, small rubber bands drawn between the teeth.

By the time the posterior teeth are in place, the little patient will have become so accustomed to the operation of having its teeth cleaned that a brush may be used. A dentifrice of precipitated chalk and sugar and a weak solution of listerin may be used to advantage, and if acid conditions are discovered Phillips's milk of magnesia will be found the most serviceable and convenient neutralizer. As the teeth erupt, a careful examination should be made by the dentist at least once a month, and note made of the approximal surfaces, especially of the lateral incisors and the molars, and should irregularities of those surfaces be found which would invite the lodgment of particles of food they may be later polished smoothly with cuttlefish disks. This polishing, however, must not be attempted till the patient has acquired sufficient acquaintance with the dentist to submit cheerfully to the operation. It is particularly necessary to thoroughly polish the distal approximal surfaces of the second molars, so that when the first permanent molars shall appear their anterior approximal surfaces may the more easily be kept free from food particles.

On the discovery of imperfections in the grinding-surfaces of the baby teeth, they are excavated as thoroughly as the circumstances will allow, that is without inflicting actual pain, and the fissures filled with cement if the cavities can be kept at all dry. If the saliva cannot be controlled, then copper amalgam or pink gutta-percha is used. If amalgam, it is used rather soft and pressed into place under pellets of bibulous paper and smoothed off with spunk. Copper amalgam, as you all know, is in many cases a very unreliable material, but one quality it does possess in a remarkable degree: it will arrest decay, and if it does wear away, where the patient is under perfect control, a little may very readily be added. I prefer the gutta-percha, however, and only use the copper amalgam where the teeth seem to be quite below the average in structure.

You will observe that I have said where imperfections are discovered those places are filled, and I mean by that that the work should be done before decay has commenced in the fissures or sulci. You will say the treatment indicated is not practicable in the large majority of cases, and I know full well that this is so, but in the practice of every dentist there are most surely a few cases where this system may be followed, and where it has been put into practice the results are a satisfaction to the soul of the dentist, a comfort to the parent, and a source of health to the patient.

Now, to take up the other class of young people who are brought to us in the various stages of indisposition. The first step as before should be a distinct understanding between the dentist and the parent. The assurance should be given that if the parents do their full duty a pronounced improvement can be effected; but should the parents decline to assume their share of the responsibility, it will be better far to decline the honor of trying to put the child's teeth in order. As in the first class of cases, the confidence of the child must be secured before operations are undertaken. Should extensive approximal decay be found, the cavities should be prepared as thoroughly as possible, treated with nitrate of silver, and filled with base-plate gutta-percha, as far as possible obliterating the spaces between the molars, the fillings being inserted separately, but in close apposition. The cavities in the anterior part of the mouth are filled generally with cement. Cavities in pulpless teeth are excavated, canals cleaned out, sterilized with carbolic acid and canals injected full of liquid paraffin, the paraffin being liquefied in a hypodermic syringe under hot water, filling the cavities in the same manner as in the case of vital teeth. It is most desirable to avoid the devitalization of the pulps in the temporary teeth, as the process of absorption of their roots would thus become a pathological action instead of the natural physiological one, and erupting permanent teeth may very easily be deflected from their proper course by coming in contact with the unabsorbed portions of the roots, and irregularities result.

Gentlemen, if you will preach this gospel of cleanliness to your patients and put into your daily work the practice herein indicated concerning the teeth of babes, following it up by your best efforts upon the adult teeth as they grow into place, I am convinced that in future years you will have many among your clients who will be to all intents and purposes in possession of perfect sets of teeth.

THOUGHTS ON MEASURING AND PREPARING APPROXIMO-OCCLUSAL CAVITIES IN BICUSPIDS AND MOLARS.

BY DR. LAURENCE LEONARD, WASECA, MINN.

(Read before the Southern Branch of the National Dental Association, February 10, 1899.)

The principle of measuring cavities in teeth is comparatively new, and is probably practiced, and hence appreciated, more in Minnesota than in any other state of the Union.

Those who take the time to measure cavities soon learn to look upon the work of preparation as being a highly mechanical and scientific procedure, and soon learn to love geometry and physics and the subsequent noting of the longevity of the filling. Let it be said that the person who measures the cavities which he prepares will soon, if he has not already done so, learn to love the actual labor which it entails as does the sculptor love his hammer and chisel. The person who cannot interest himself in the mechanical work *per se* must needs find it difficult and laborious, and must needs perform it inaccurately and imperfectly. The one is scientific and sublime, the other empirical and ridiculous.

It is probable that one of the most important measurements is that of the width of the cavity bucco-lingually. This importance comes from the fact that approximal cavities heretofore filled have shown their greatest weakness bucco-cervically and linguo-cervically, and from the necessity of having some average width bucco-lingually, which, as a rule, may be followed. Sixty almost ideal cavities were prepared and measured by your essayist, and which gave an average of nearly two-thirds the width of the tooth, as the following tabulation shows:

TABLE—GIVING AVERAGE MEASUREMENTS OF SIXTY CAVITIES.

Upper Bicuspids.			Upper Molars.		
Width of tooth.	Mes. Cav.	Dis. Cav.	Width of tooth.	Mes. Cav.	Dis. Cav.
9.1115	$5\frac{5}{10}$	$5\frac{7}{8}$	11.24375	$7\frac{1}{16}$	$7\frac{1}{25}$
$\frac{2}{3}$ Rule....................................6.0743			$\frac{2}{3}$ Rule....................................7.4958		
Lower Bicuspids.			Lower Molars.		
Width of tooth.	Mes. Cav.	Dis. Cav.	Width of tooth.	Mes. Cav.	Dis. Cav.
8.25	$4\frac{6}{10}$	$6\frac{1}{10}$	9.9763	$6\frac{7}{10}$	$6\frac{1}{6}$
$\frac{2}{3}$ Rule....................................5.5			$\frac{2}{3}$ Rule....................................6.65		

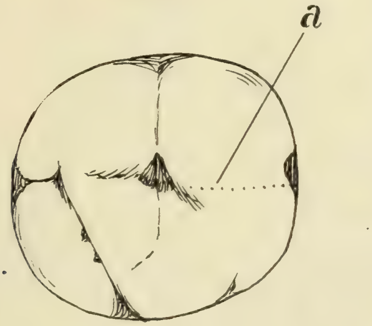
In July, 1897, the essayist read a paper before the Pacific Coast Dental Society in which he gave this same rule, or two-thirds average. The article was published in the *Stomatological Gazette*, of San Francisco, in October of the same year. The December DENTAL COSMOS contains an article by another dentist arriving at the same two-thirds rule, entirely unconscious of my previous finding. This is a coincidence of more than passing importance, as it shows that the disciples of Dr. Black find it necessary to "extend for prevention" their cavities two-thirds bucco-lingually the width of the tooth. If Drs. Black, Johnson, and other scientific men would give us their cavity measurements they too would undoubtedly corroborate the same two-thirds rule; *e.g.*, if a bicuspid were nine millimeters wide, the cavity should be six millimeters; if a lower molar ten millimeters wide, the cavity should be six and two-thirds millimeters; and if an upper molar were twelve millimeters wide the cavity would be eight millimeters wide bucco-lingually.

The profession should certainly adopt some average measurements for those common cavities, hundreds if not thousands of which are being filled every day, and those measurements should be taught in our colleges on the same principle that average doses of medicine are taught. Thus there would be uniformity in the conception of what ideal cavities are. Of course these ideal cavities could not always be followed, but, nevertheless, the ideal cavities should be known. It is impossible to know imperfection if we do not know what perfection is.

We have probably all seen "specimen fillings" brought in extracted teeth to our meetings,—done at leisure in the laboratory, when all mechanical and scientific principles should have been observed,—and yet no two of the same class of cavities were anything near alike. The width of one perhaps three-fourths, the width of the other one-fourth, and the general shape prepared by the rule "be guess and be guess," or wherever the instrument penetrated the easiest. Let us have some rule of measurement and formation, so that if a dentist were to bring before this meeting one hundred cavities of the same class for inspection they would all be found very near alike.

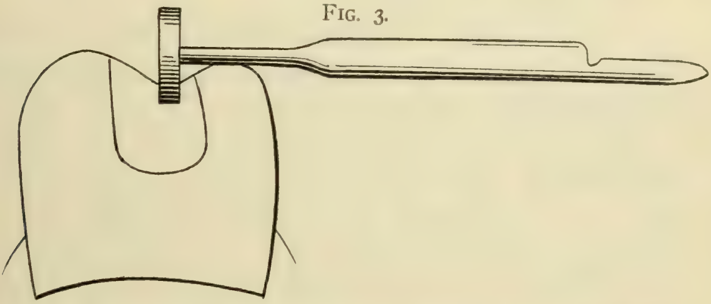
A few words as to the method of preparation. The essayist would recommend, as far as possible, the discarding of the bur and the employment of the chisel and stone. Burs cut dentin very nicely, but for enamel they are not suitable. We grind glass, diamonds, etc., but it is impossible to bur them.

FIG. 1.



For the opening of these cavities which we are considering there is nothing equal to properly-shaped and directed chisels, struck by a quick, elastic blow from a hand mallet. If so done, enamel whose underlying dentin is at all softened will split like Southern pine; but it must be struck with the grain, not against it, nor partly against it; it must be struck scientifically.

FIG. 3.



As to the preliminary opening of the step, it is perhaps the most trying to the operator and most painful to the patient, especially where there is no decay or fissure. (Fig. 1, *a*.) To remove this portion of enamel the essayist has found the use of a small corundum wheel, kept cool and moist with water, or a small diamond wheel, an invaluable method. (Fig. 3.) Grinding pulpally until the dentin is reached (which is readily recognized and manifest by the patient), after which the remaining short portions of enamel-rods can easily be torn from their fastening by an inverted cone (Fig. 4), cutting, at the same time, the floor of the step cavity, the only place where an inverted cone is permissible in these cavities.

Now as to preparing the cervico-axial angles. As up to this time there has never been any scientific test, each dentist has his own particular way.

FIG. 4.

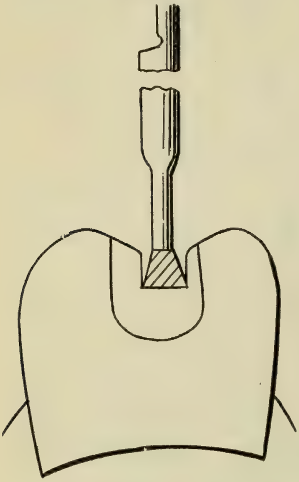
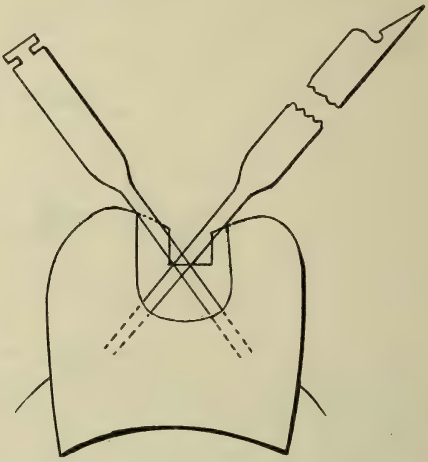


FIG. 5.



Your essayist has conducted a series of experiments upon ivory, using the different engine instruments which are generally used in cutting dentin. The experiment was conducted in such a manner that the pressure on the bit or bur was mechanical, and the same throughout the different tests, thus eliminating personal equation.

TEST NO. 1.

Thickness of Ivory, 3½ Millimeters.

Round Revelation Bur	No. 6	40 revolutions.
“ “ “	“ 6	38 “
Inverted Cone Revelation	“ 4	145 “
“ “ “	“ 4	153 “
“ “ “	“ 2	204 “
Round Revelation Bur	“ 2	600 “
“ “ “	“ 2 stopped	200 “
Spear drill	“ 2	25 “
“ “	“ 2	20 “
“ “	“ 2	14 “
“ “	“ 2	14 “
“ “	“ 2	16 “

TEST NO. 2.

Thickness of Ivory, 1 8-10 *Millimeters.*

Round Revelation Bur	No. 6	15 revolutions.
“ “ “	“ 6	16 “
Inverted Cone Revelation	“ 4	39 “
“ “ “	“ 4	34 “
Round Revelation Bur	“ 2	10 “
“ “ “	“ 2	10 “
Inverted Cone Revelation	“ 2	60 “
Spear drill	“ 2	5 “
“ “	“ 2	5 “

So, you see, for direct penetration, the best instrument is a drill. For shallow penetration, say from one to two millimeters, the next best is a round bur and the poorest is an inverted cone.

FIG. 6.

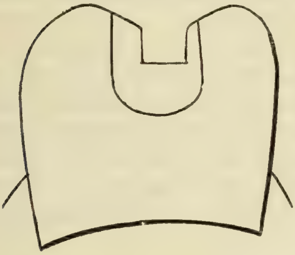
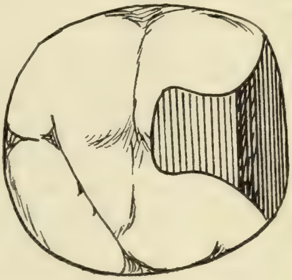


FIG. 7.



It follows, then, that the least painful way to prepare these angles, linguo-axio-cervical and bucco-axio-cervical, is to first cut at the desired angle and depth with a spear-shaped drill (Fig. 5), after which a bur can be inserted into the bottom of the holes made by the drill, and lateral or drawing cuts made in the periphery of the dentin, as indicated. The unsupported cervical enamel can then be easily and painlessly removed by means of properly-shaped cervical chisels.

Figs. 6 and 7 represent the finished cavities according to my rule and method.

COMBINATION FILLINGS.

BY DR. L. A. SMITH, PORT GIBSON, MISS.

(Read before the Southern Branch of the National Dental Association, February 10, 1899.)

THE combination of different filling-materials indicates clearly the want of an ideal not only as to color, but one that will withstand the destructive agents and rough usage to which fillings in teeth are subjected; and which shall have that property which induces and assists nature to self-protection.

Before speaking of the various filling-materials and their different combinations, though I shall not attempt to mention all of them, I shall speak of the conditions which do and *may* exist under fillings and the analogy borne by the hard (tooth) tissue to that of the soft tissues in some of nature's processes.

That portion of a tooth that comes in contact with a filling does not remain normal; by calcific deposit it becomes denser than the normal tissues. The reverse of the above *may* be the result, or rather is possible.

The first process mentioned bears analogy to that of encysting foreign bodies by the soft tissues. Encysting is not nature's only method of disposing of foreign bodies. If too incompatible there is a breaking down of tissue, and the offending body is thrown off. Is it possible that this last process may sometimes be exhibited in tooth-structure?

All fillings act as irritants, to a greater or less degree, to the exposed tissue. Too much irritation we know is objectionable, but a proper amount is necessary, as the tooth throws out a protective layer about the filling, thus becoming stronger and rendering fillings more serviceable. This is one of the ways in which the filling induces nature to respond to her own defense.

Cement fillings, on account of color, adaptation, and adhesiveness, would take the lead as nearest the ideal were it not that it yields to the influences of the agents against which it should stand guard. But, in combination with amalgam, some of its good qualities may be had and a better filling made, where color is not objectionable, than by either material singly. Having cavity—approximal, bicuspid, or molar—prepared, and material all ready, mix cement, discretion as to consistence, placing sufficient quantity in center of cavity, spreading slightly; begin filling with soft amalgam; first piece large enough to form a layer over bottom of cavity; pressure with a suitable instrument should be made at proper points to more firmly fix amalgam to cement.

Burnish the filling from within outward, being careful to leave no cement at margin of cavity or feather edge to amalgam. Sufficient shoulder should be left at cervical border to prevent amalgam being forced out. Unless cavities are large and tooth needs strengthening, only a small quantity of cement need be used.

Argument as to the advantage in this combination I think unnecessary.

Some operators use gold and cement before cement sets, but I prefer, where I have to make a combination of gold and cement, to wait until the cement is hard.

Amalgam and gold are used in combination for different purposes. Amalgam for its antiseptic properties, or as protection at the cervical border, or as a time-saver, and in building up teeth that the all-gold worker would cap with a gold crown.

That the combination (gold and amalgam) has the antiseptic property, or bears that relation to tooth-structure that induces and assists nature to overcome caries, will not admit of doubt.

As in the case of cement and amalgam, the best qualities of both materials are obtained. It would seem superfluous to add another metal to such a combination of metals as amalgam, to which scientific men have given years of thought and labor in preparing it to meet the requirements of a filling. Yet experience has proven the wisdom, and the gold is only added, not mixed, at the weak points in amalgam fillings,—namely, the cervical border and one-third of walls adjacent or cervico-buccal, or cervico-lingual, as may be, and crown. A case: approximal cavity of bicuspid or molar; cavity prepared as for gold. Having been separated with cotton, a matrix reaching half the length of tooth, with upper edge beveled from inside, is held in place with small wedge, as close to cervical border as possible, to allow matrix to prop back against adjoining tooth. Begin filling with soft gold pellets pressed in place with a piece of kid, or with a ribbon of soft gold of proper width and length to cover bottom of cavity and one-third walls on either side. Amalgam is added until cavity is half or two-thirds full, and filling finished with gold. The approximal surface should not be finished until the amalgam is hard, when it may be separated and polished.

Very large crown fillings may be made by filling cavity two-thirds with amalgam, and burnish gold in until all surplus of mercury is taken up, when cavity can be finished with mallet, as in full gold filling.

It is not best in all cases to finish with gold before amalgam is hard. Amalgam makes a good patch for gold fillings, and gold makes a better patch for amalgam than fresh amalgam.

Of the combination of tin and gold I have little to say in its favor, as results at my hands have not been satisfactory. Failure to get the proper proportion probably was my trouble.

MICROSCOPIC ILLUSTRATIONS OF THE EFFECTS OF CATAPHORESIS.

BY DR. A. F. SONNTAG, WACO, TEXAS.

(Read before the Southern Branch of the National Dental Association, February 11, 1899.)

Two years ago it occurred to me that the only true and scientific method of investigating this subject would be by means of the microscope. I have prepared a number of microscopic slides to demonstrate cataphoresis, showing the effect on the tooth-substance by means of colored solutions. All of my experiments were made out of the mouth, from freshly extracted teeth, and under conditions resembling the natural condition of the mouth as closely as possible. In every instance the tooth was imbedded in moist sponge, only the crown remaining uncovered. The rubber-dam was adjusted to prevent any contact of the positive electrode with the sponge, the sponge connected with the negative pole, and the positive pole applied to the cavity. The solution used is a twenty per cent. solution of cocain colored with methyl violet. The strength of voltage used is the average that I am using on my patients in practice. I am able to show only the effect of cataphoresis on dentin at present, but in the future I hope to be able to also show you the effect it has on the pulp.

Now let us consider the tissue through which the electric current, carrying with it the solution and the substances it holds, has to pass to produce local anesthesia. Enamel is composed mostly of inorganic matter containing but little moisture, and by reason of its structure prevents the passage of the electric current and fluids through it.

Dentin, on the other hand, composed of seventy-two per cent. of inorganic and twenty-eight per cent. of organic matter, a homogeneous mass, penetrated by many parallel canals, filled by soft homogeneous fibrils, having many fine branches and increasing in number toward the periphery of the dentin, gives but little resistance to the electric current. The current, carrying with it the solution, passes through the homogeneous fibrils in the dentin toward the pulp. Dry dentin will resist the current. A glass tube filled with powdered dry dentin, when inclosed in the circuit of the cataphoric apparatus, will resist all the current which the cells in the apparatus will produce.

Slide No. 1. A bicuspid, no decay, the cavity being made artificially. A pellet of cotton saturated in the cocain and methyl violet solution placed in the cavity and left in it for thirty minutes. None of the coloring fluid has penetrated the dentinal tubules.

Slide No. 2. Also a bicuspid, the cavity made artificially, a pellet of cotton saturated in the same solution, and the electric current applied fifteen minutes. The solution has not only penetrated the dentinal tubules, it has reached the pulp; but the coloring does not extend over all the surface of the cavity,—only a part of it is affected in large cavities. The current seems to pass through a sufficient number of canals required for its passage, and it seeks the shortest and most unobstructed route where it encounters the least resistance to reach the pulp. This demonstrates plainly that cataphoresis is of but little value in our work, unless we anesthetize the pulp, or, at least, the upper portion of it. Even in small cavities, where we can drive the solution into all the tubules that are exposed, if the solution does not reach the pulp all the tubules outside of this small circle will retain their sensitiveness. This accounts for the occasional failures we have. If we could confine our work to the small anesthetized circle it would be successful, but to make undercuts and to prepare the cavity properly we are invariably compelled to go outside of this circle. In larger cavities this will be more marked than in smaller ones, although in practical cases it seems generally the reverse; but this is easily accounted for. In large cavities the pulp is in closer proximity, and it is more easily reached by the current. Also decay of dentin plays an important part, as we will show directly.

Slides Nos. 3, 4, 5, 6 will show the same result.

Slide No. 7. Current and solution applied to normal dentin, and section made across the dentinal tubules, the coloring matter showing plainly in the tubules.

Slide No. 8. A root; the external surface ground away, and current and solution applied thirty minutes to the cementum; no penetration of coloring matter.

Slide No. 17. Now we come to consider cataphoresis in connection with carious teeth and the practical value in our every-day work. I have shown with the previous slides that normal dentin is easily penetrated by the electric current, carrying fluids and substances which it holds in solution to the pulp. But decayed dentin does not present the same facility to the current as does the normal. In caries the elements of the dentin are removed, producing first a softening of its structure, and as the process progresses further disintegration takes place until all the original structural elements are lost. The dentinal fibrils are the first to be attacked, the fibril substance destroyed, the lime-salts softened, leaving the dentinal canals filled with waste product. Here we have our minute conductors of the electric current destroyed, producing entirely changed conditions. Decayed dentin will not permit the current and fluids to pass through it readily; it offers too great a resistance by reason of its non-structural condition. By that I mean only dentin which has lost its structural form, not the deeper layers that have been affected by decay, but still retain the structural form.

Slide No. 9. A cavity to which current and solution was applied without removing the thick layer of decay, with the result that we have practically no penetration.

Slides Nos. 10, 11, and 12 give us the same results.

Slide No. 13. The superficial layer of decay removed before applying the current, and the result is that the penetration is complete at two points in the dentin and extends through it to the pulp-chamber. This is the typical result of successful anesthesia, and it shows us that we must remove the superficial layer of dentin, or part of it, at some point in the cavity.

Slide No. 14. To more fully demonstrate the resistance offered to the electric current by decay, I have prepared this slide. Before applying the current to the cavity, which contained a thick layer of decayed dentin, I exposed the healthy dentin at another point some distance from the cavity, the pellet of cotton with the solution covering both points, but the electrode placed only in the cavity. The result is that we have but little penetration of the coloring fluid in the cavity, but where the healthy dentin is exposed the penetration is complete, although the distance between the cavity and the pulp is much less.

Slide No. 15. A cuspid; the enamel worn off of cutting-edge by mastication; current, and solution applied thirty minutes; no penetration of solution.

Slide No. 16. A similar tooth, but before using the current the superficial surface of the exposed dentin is cut away, thereby opening the dentinal tubules and giving more free access to the solution, with the result that the penetration is complete.

In conclusion, I wish to say a few words in regard to the solutions used in cataphoresis. The solution should always be only pure cocain. I notice in the dental journals that many use and advocate the use of solutions containing other ingredients to make it antiseptic, and to give it better conducting power. These solutions may work better, but I would be very much afraid of the result they might produce. If cocain in solution will penetrate and reach the pulp, the other ingredients will do so also, and while the cocain only produces local anesthesia, which passes off in a short time, any other ingredient contained in the solution might produce results disastrous to that delicate structure. My method in practice is to moisten a pellet of cotton, large enough to fill the cavity, in water, then dip it in pure cocain crystals and place it in the cavity. Only a few crystals are necessary to produce the desired result.

THE RADICAL CURE OF CONGENITAL CLEFT PALATE.

(With exhibition of patients.)

BY TRUMAN W. BROPHY, M.D., D.D.S., CHICAGO, ILL.

(Read before the National Dental Association, August 1, 1899.)

I DESIRE to call your attention to a few cases which I will briefly describe, and to exhibit a few of the patients upon whom I have operated for immediate closure of the hard palate in early infancy. I am but too well aware that the methods that I pursue are not generally practiced, and that they have been criticised by those who do not fully comprehend them. It is gratifying, however, to realize that many of our most distinguished surgeons, who formerly questioned my methods, are now most enthusiastic advocates of them.

The question of early operations has, with me, passed the experimental stage. I will confess that my first cases were undertaken with a great deal of hesitation. I knew that I was transgressing all the long-accepted rules of surgical procedure; but it seemed to me so reasonable that the patients should be able to undergo the necessary trial that I ventured.

We know that the struggle of birth is often more severe than is this. There are sometimes misplacements and replacements of cranial bones during this critical natural process, more radical than that of bringing into apposition the separate bones of the maxilla. It has been the observation of every obstetrician that the injuries which the child sustains during parturition produce little immediate or ultimate injurious results.

My experience in some hundreds of operations performed for the closure of cleft palate, at from ten days to three months of age, has more and more confirmed my opinion and justified the practice.

I believe in operating at as early a period as is practicable after birth. My reasons are as follows:

First. The surgical shock is less, for young children react better, provided there is sufficient vitality. All mental apprehension is eliminated, and we all know that alarm and dread are among the most powerful factors in producing shock. Besides, the nervous system of a young child is not well developed, and it is not therefore capable of receiving the same impressions that it would later in life.

Second. Before the bones are fully calcified they may be bent or moved without full fracture, and hence the injury is really less than it would be if calcification were more complete.

Third. If the muscles are very early brought into action they develop instead of atrophy, and hence a good velum is secured, with plenty of tissue; when if the operation is undertaken later in life, after the parts have shrunken through non-use, they can rarely be made to subserve the same purpose that organs which have developed through natural employment can be made to do. It is well known that muscular tissue is more perfectly developed through action. In instances of cleft palate none of the muscles of the velum can be normally employed when the parts are not united, and hence they remain in an immature condition through life, even when an artificial substitute is inserted. By operating at a very early age they are at once brought into use and their development is proportioned to that of other tissues.

Fourth. When the palatal processes of the maxillæ are united it will be observed that the development of the bones and alveolar processes of the upper jaw assume a form nearly or quite normal, and when the teeth are erupted that they will properly occlude with the lower ones, or nearly so. In my first case the breadth of the upper jaw was reduced about three-fourths of an inch, while the lower one was twice that measurement. It was predicted by my surgical friends that the upper jaw was so much narrower that it must always remain contracted, and that when the teeth were erupted the upper ones would probably be considerably within the arch of the lower ones. My answer was that later on probably it might be within the province of the dentist to correct that by orthodontial methods. Rather to my surprise as time went on the bones developed and the arch spread until, when the upper teeth were erupted, they occupied nearly or quite the normal relation to the lower ones.

Fifth. Following early operations there is much less of deformity, for all the tissues, bony as well as soft, develop naturally and according to accepted types. When the operation is postponed for a few years it is very difficult to secure such results.

Sixth. When the operation is made during early infancy the parts are sufficiently advanced to give possibility for normal speech when the time comes for learning to articulate. If the operation is not made until faulty habits are acquired it is with difficulty that they can be completely overcome, even supposing that the muscular parts could be made sufficient.

I especially believe that it is highly important that the operation upon the palate should be made before that upon the lip. It is a great mistake to commence at the oral opening and partially close the only aperture through which a subsequent palate operation must be made. The surgeon needs all the space that can be secured, which is none too much in a young child. The lip operation is comparatively simple and trivial, and it can be performed at any time; but the palate operation is made much more difficult if prior to that the lip has been closed. In proof of this I bring before you several patients whose condition will I think convince you that my position and practice are correct.

The first patient I show you is one upon whom I operated when she was ten days old. In this case we had double hare-lip and a wide cleft of both hard and soft palates. The palate was closed throughout its entire length at one operation. The tissues have assumed a normal relation and form. The arch is sufficiently wide to serve every purpose, and the occlusion of the teeth is fairly good. You will notice that the occlusion of the upper with the lower teeth is not quite normal, but by employing means well known to dental practice these teeth can be forced a little farther out so as to properly occlude with the lower ones. The fissures of the lip extended into the nostrils; the intermaxillary bones and the central portion of the lip were rudimentary. The lip therefore was formed by utilizing the tissue lateral to the fissures. An improvement in its appearance is yet to be made by removing some of the integument and reflecting the mucous membrane upward, thus shortening the lip. The child is now nine years old.

The second patient I show you is a child three months old. I operated for closing of the hard palate in this case when the child was three weeks old. I exhibit a model of the parts as they were prior to the operation, and I ask you to observe that it was by no means an ordinary case. The opening is unusually wide and the amount of tissue present comparatively small. On examination of the patient you will see the hard palate is completely closed, the parts being in good apposition through the reduction of the arch. The opening through the lip gave good access to the parts, and the operation was performed with greater ease because of it. The lead plates and the silver sutures which were employed to hold the bones in contact are still in position. This little child is a brother of the little girl first exhibited. It is interesting to note in this connection that, of the six children born to the parents of these two, four of them were defective in this particular. The oldest one was healthy and no evidence of the deformity existed, even to the slightest degree. The second one was afflicted with double hare-lip and cleft palate; the third with hare-lip; the fourth with double hare-lip and cleft palate; the fifth was normal, and the sixth with single hare-lip and cleft palate.

The deformities in these children have confirmed my opinion that nearly all such cases have a hereditary origin, the paternal grandfather having been similarly afflicted. The methods of procedure in operating for the closure of cleft palate are described as follows:

Place the patient on the table with the face toward the light. Introduce the oral speculum and thoroughly remove the edges of the fissure. A mere scraping of the mucous membrane is not sufficient to enable us to bring about union which will be permanent and satisfactory. Trim the opposing edges of the bones as well; it will secure a sufficient exudate (so essential to a perfect union), and will make the operation a successful one in this respect at least. The knife will easily cut through the soft bone of the hard palate and the alveolar processes of young patients.

Then raise the cheek, and well back toward the posterior extremity of the hard palate, just back of the malar process, and high enough to escape all danger of not being above the palatal plate of the bone, insert a large braided silk suture, carrying it through the substance of the bone, so that it will come out at a corresponding position upon the opposite side.

The silk suture is more easily introduced by the needle than wire, but a silver wire suture should be substituted for it, and drawn through in its place. The wire should be about No. 19, and may be doubled in case the condition of the parts and the tension upon the tissues necessary to approximate them seem to require it. Nearer the front portion of the palate insert another wire, carrying it through the substance of the bone above the palatal plate, and out through the other side in a position corresponding to the place of entrance. Thus we shall have one wire passing over the palate in front of the malar process of the bone, and another behind it.

The next step is to make lead plates to fit the convexity of the buccal surface of the bones. Have them provided with eyeholes, through which are passed the protruded ends of the wire upon each side. Twist these together; that is, the right end of the anterior wire with the right end of the posterior wire, and the same on the left side. These form heavy tension sutures, and once approximated the parts cannot be separated.

If we are unable to close the fissure with these wires, if from lack of tissue or from firm resistance of the parts the strain is too great, there is a further step to be taken which will obviate these difficulties. After the cheek is well raised, divide the mucous membrane and bone through the malar process. Carry the knife in a horizontal direction, and when well inserted sweep the handle forward and backward. In this way a maximum amount of bone and a minimum amount of the mucous membrane is divided. This done on each side, the bone can very readily be moved toward the median line. The wire sutures passing through the lead buttons may now again be twisted, and the cleft of the hard palate be closed by approximation of the two sides. The incision in the mucous membrane in making the separation of bones is made as small as possible, as this membrane must serve to retain the bones in proximity, or to hold them nearly together.

If after the parts are approximated they are kept antiseptically clean, they will unite kindly and the palate will be restored, so that its full function will be performed. Separation of the bone is attended with little hemorrhage, and the parts do not usually cause more inconvenience to the patient than the ordinary operation of lifting the hard palate according to the practice of Sir William Ferguson.

The germs of the teeth are sometimes disturbed, and I have occasionally found certain teeth imperfectly developed when erupted.

The palatal arch is contracted, but this will not be permanent, for, if the operation is performed early enough, when development is complete the teeth of the upper jaw occlude naturally with those of the lower jaw. It is a well-known fact that the alveolar processes develop with the teeth, and this appears to be a pronounced factor in the formation of the jaw and the guiding of the teeth into their proper position.

After the approximation of the edges in the manner I have described, the parts should be thoroughly dried, the edges of the cleft carefully examined, and if need be some fine sutures inserted here and there to insure perfect coaptation of the parts. The after-treatment is very simple, consisting solely in antiseptic cleanliness, nourishing the patient upon liquid food, the prevention of disturbance of the parts by the child, or of the introduction into the mouth of anything that might interfere with the sutures. Abrasions of the mucous membrane caused by the lead plates need not disturb the operator, for they are usually slight.

The plates are to be left in place from four to eight weeks, but the silk coaptation sutures should be removed about one week after the operation.

THE LEGAL STATUS OF THE GRADUATE DENTIST.

BY J. A. CHAPPLE, D.D.S., ATLANTA, GA.

(Read before the National Dental Association, August 1, 1899.)

As a significant and valuable contribution to the history of dentistry in America, I submit a decision rendered by the Supreme Court of North Carolina on December 4, 1863, which for the first time, from a legal standpoint, made the dental surgeon co-equal with the physician.

When it is considered that at the time this decision was handed down the newspaper was an almost extinct institution, by reason of the scarcity of paper and printing material in that section, it is natural to infer that it was never printed in a newspaper and thereby failed to become a matter of general information.

It is also evident that this is the first and last legal decision bearing upon the relation and status of the dentist, since the distinguished chief justice declared "the question was new and had not, so far as I could learn, been decided." And that it is the last decision touching the legal status of the dentist in this country at least is more than probable, since the conditions which brought it about have not since existed until the declaration of war with Spain.

It will be readily noted that while defining the legal status of the dentist, the decision unwittingly has a threefold significance,—to wit,—(1) That the dentist, in the full significance of the term, is a physician; (2) That as such, according to the act of Congress, he is exempt from army service, and (3) The physician under the law being exempt from *jury* duty, the dentist can also claim exemption where it is not specially provided in the dental laws of the respective states.

From a further close analysis of this decision it is seen that only "regular *graduated* dentists" can claim protection under it, for the judge distinctly declared, "With the aid of these depositions and the argument filed by Mr. Fowle for the petitioner, I am satisfied that a *regular graduated* dentist is a 'physician.'" So that, to carry the proposition to its logical sequence, the non-graduated "dentist" is not a physician, nor can he claim exemption from either army service or jury duty.

This decision is found in the sixtieth North Carolina Reports. Winston's.

In the Matter of Hunter:

A DENTIST is a physician, within the meaning of the Act of Congress, and is exempt from conscription by reason thereof.

PEARSON, C. J. The petitioner is thirty-seven years of age. In 1856 he graduated at "Philadelphia College as a *surgeon dentist*, and has ever devoted himself exclusively to the practice of his profession, in which he is skillful, and in fact eminent.

The Act of Congress exempts "all physicians who now are, and for the last five years have been, in the actual practice of their profession."

The question is, Does the word "physician" embrace a surgeon dentist?

In a restricted sense "physician" means one who administers medicine to cure disease, but, in its proper sense, it has a broader signification, and means one who, by a knowledge of the nature and structure of the human system, and of the nature and properties of substances, cures the injuries and diseases to which it is subject.

It is derived from a Greek word, "phusis," nature—which is the root of many other words; "physic," medicine; "physic," to treat with medicine, to evacuate the bowels, to purge; "physics," the science of nature and of natural objects; "physical," pertaining to the material part or structure of an organized being, as "physical strength," "physical force," as distinguished from "moral force;" "physiology," the science of the functions of all the different parts and organs of animals and plants, the offices they perform in the economy of the individual, their properties, etc.

To say of a substance having the property to evacuate the bowels, it is a "physical herb," is not as appropriate as a "medical herb," because it uses the word "physical" in its narrow sense.

From its derivation I am satisfied I have given the word physician its proper definition, and it includes not only "doctors," who administer medicine and physic, but "surgeons," who, by a knowledge of the nature and structure of the human system, are able to amputate an injured and diseased limb, or to extract a ball with skill and as much safety to life and as little pain as the case admits of. So the question is narrowed to this: Does a surgeon dentist come under this definition of the word "physician," or is he a mere mechanic who cleans, plugs, and extracts teeth without the aid of science?

As the question was new and had not, so far as I could learn, been decided, I adjourned the case and required evidence to be taken as to the course of instruction at dental colleges, the knowledge it was necessary to acquire in order to obtain a diploma and to practice with skill, and any other facts calculated to aid in the solution of the question: Is a dentist a machine merely, or a *surgeon,* devoting himself exclusively to one branch of the profession?

The depositions of many eminent gentlemen of the profession are filed; they all state that the course of instruction at the college includes anatomy, physiology, and *materia medica,* and a knowledge of all of these sciences is necessary to obtain a diploma and enable the party to practice with skill; and I concur in the opinion that a dentist is a "surgeon, devoting his practice to a specialty." With the aid of these depositions and the argument filed by Mr. Fowle for the petitioner, I am satisfied that a regular graduated dentist is a "physician." I will add that all who remember the time when "the doctor" carried in his saddle-bags that horrid instrument, a "pollican," and extracted teeth by main force, frequently bringing with it a part of the jawbone, will readily admit that the division of labor has contributed greatly to the improvement of this branch of the science, and the safety and ease to the patient; for now, instead of the "pollican" and brute force, there are various instruments fitted for each particular case.

Teeth are often saved by removing the decayed part and filling and plugging, and new teeth are inserted, adding as well to the comfort as to the looks of the individual; and if a tooth has to be extracted the "surgeon dentist," by his knowledge of "physiology," ascertains the condition of the system, and by his knowledge of "materia medica" administers the necessary alteratives to put it in proper condition; and by his knowledge of anatomy finds how the tooth is inserted in the jawbone, and knows what instrument will extract it with as little pain as possible, and without injury to the bone; and the depositions state that frequently surgeon dentists are called in to perform delicate operations on the "facial parts" (the upper and lower jawbone), which requires an intimate knowledge of the structure of the bones and the location of the arteries, veins, and nerves. In short, the teeth being more subject to decay and disease than any other part of the human body, I am satisfied not only that regular educated dentists are physicians, but that the human family are much indebted to them for confining themselves to a "specialty," that is, one branch of the profession, whereby that which was some years ago a mere mechanical art has become a useful and important science.

It is therefore considered by me that John W. Hunter be forthwith discharged with leave to go wheresoever he will.

The cost, to be taxed by the clerk of the Superior Court of Forsyth county, will be paid by J. H. Anderson. The clerk will file the papers in his office and give copies.

At Richmond Hill, December 4, 1863.

PORCELAIN ENAMEL INLAYS.

BY N. S. JENKINS, D.D.S., DRESDEN, GERMANY.

(Read before the National Dental Association, August 1, 1899.)

THE process and the material which I have the honor to present to you are the result of seven years of study and experiment. The evolution has progressed, through its various stages, by having the work of the laboratory at once tried in the mouth. Scientific experiment and practical application have gone hand in hand, each supplementing, criticising, enlightening the other. More than two years ago the constituents of the body were definitely settled, and since that time a considerable number of the foremost dentists in the world have used this process, in their daily practice, with results similar to those I have myself obtained. I feel therefore justified in announcing to this distinguished association that the problem of making, with mathematical accuracy and scientific certainty, absolutely perfect fillings in diseased teeth has been completely solved.

Doubtless we shall all agree as to what constitutes a perfect filling. It must fill the cavity so exactly as to exclude moisture. It must be of a substance which will not disintegrate nor change its original form either through chemical action or mechanical force. It must have a surface so smooth that it can easily be kept clean. It must be a poor conductor of caloric. It must restore the color and shape of the teeth. It must be applicable to the most desperate cases and must be susceptible of being used without too great a strain upon timid children and delicate invalids, as well as upon ordinary patients, and its working must not make too great drafts upon the strength and nerves of the operator. Last of all, it must be possible for any good dentist to use it with the certainty of obtaining infallible results. All these qualities are possessed by the material which I have called Porcelain Enamel.

At the outset I was convinced of the necessity of obtaining a substance which could be melted in a gold foil matrix. It is quite true that skillful men often obtain splendid results, in favorable positions, with properly annealed platinum; but my object was to find a process and a material which could be used successfully, by any competent dentist, in cavities in any part of the mouth, not as an unusual operation, but as an ordinary and regular proceeding in daily practice. With gold foil alone would this be practicable. Any capable man can certainly learn how to approach and how to shape a cavity in any position, so as to get a perfect impression in gold foil, but it will be only a most exceptionably gifted and patient man who can obtain such results everywhere with platinum foil, owing to the intractability of this otherwise most useful metal.

A perfect impression is the indispensable foundation of a perfect inlay. Gold foil No. 30 seems best adapted to the great majority of cavities. It is so thin that wrinkles can be easily obliterated, and yet stiff enough to admit of being worked out, in nearly all cases, without danger of bending or losing its shape. In very large and complicated cavities No. 40 may, however, sometimes be used with advantage. Given the gold foil impression it was necessary to find a simple and reliable method of keeping it exact during fusing. A paste of powdered asbestos and water was found to be quite strong enough to hold the impression in its place in the melting pan. In drying the asbestos, however, which may be done simultaneously with the first fusing, the moisture should be gently evaporated and not violently boiled out by suddenly applied heat.

My experiments began when the electric furnace was not in its present practical condition nor in such general use, and I found it necessary and, indeed, in many ways more convenient to use the heat of gas for fusing. A simple heater, lined with asbestos, open at one side and with a round opening at the bottom and a platinum cup and cover of a definite size, was found to be well adapted to the purpose. Through an opening in the cover of the platinum cup the process of fusing could be observed, a matter of consequence, especially in contouring. The best bellows for the blow-pipe I found to be the so-called Standing bellows, for, by its means, the necessary steadiness of the draft could be obtained.

All these details, while important, were easily and naturally evolved, but the composition of the material itself was a matter of far greater difficulty.

At first I had great hopes of obtaining my aim with glass, after the manner suggested by Herbst, Richter, and others, in spite of the evidence that this seductive and treacherous substance would disintegrate in a warm, moist environment, such as the mouth affords, and it was only by repeated failures that I was led to seek and find the happy combination of ingredients which unites the essential qualities of both porcelain and enamel. In this long search I had the frequent aid of some of the first chemists and practical experts in ceramic art, and my discovery, such as it is, was founded upon the labors of many far more able investigators.

Porcelain enamel has sufficient strength to withstand the force of mastication, and a surface which resists all chemical action except that of hydrofluoric acid. It resembles the substance of English porcelain teeth in many respects, but it fuses at a temperature of between 800° and 900° C., the melting point of gold being, according to the most recent authorities, 1075° C. This difference is quite sufficient to prevent melting the gold matrix, except through great carelessness. The variation of the melting point is also sufficient to prevent the gold foil from adhesion to the porcelain enamel, it being easy enough, with a little practice, to strip off the gold in one piece, or to scratch away any fragments which may inadvertently remain attached to the inlay.

By the perfect removal of this perfectly exact thickness of the matrix from the inlay, the latter naturally fits the cavity exactly, and should not rock under pressure nor show a line visible to the naked eye between the inlay and the edges of the cavity.

With such an absolute fit only a slight film of cement is necessary for retaining the filling, but it is important that the inlay should be grooved with a small diamond disk before being set, and also that the cavity should receive some slight undercuts. Under such conditions the color or opacity of the phosphate cement is a matter of trifling importance. A little cement will cling for a time to the joint, and, until it dissolves, there will be a slight barrier to complete harmony of color; but it is so slight, in most cases, as to be noticeable only under dryness and with a magnifying glass. After a time the color of all perfect inlays seems to improve, owing, perhaps, chiefly to the disappearance of the slight overflow of cement, which it is usually unwise to attempt to completely remove by mechanical means.

Many objections have been raised to using phosphate of zinc for setting inlays, but I know of no such objections which are well founded. Properly used it accomplishes its purpose so well that I can see little necessity for seeking for a substitute. If the inlay fails, it is always owing to some fault in manipulation and not to any defect inherent in zinc phosphate cement. If the inlay fits, as it should, the cement will no more dissolve out than under a gold filling, and with the lapse of time it becomes so hard that its removal is a matter of considerable difficulty. In my earlier experiments I used some materials which caused the inlays to discolor in the mouth, and wherever I find such a case I induce the patient, whenever possible, to have the old inlay removed and replace it with one of the perfected material; but it is an operation to be dreaded, since the old filling is almost invariably very firmly attached by the cement, which, quite as invariably, retains its color as well as its consistence.

I have no faith in the theory that pulps die under the deleterious influence of phosphoric acid. When I first came to Germany, thirty-three years ago, I found the native dentists, who were, at that time, as a class, far less well educated and capable than is now the case, using a great amount of phosphate where an American dentist would naturally employ gold. There came to me a large number of cases where the pulp had died under such fillings, but I cannot remember ever to have seen a single instance where there was not evidence that the phosphate had either been placed over an exposed pulp or else the ordinary precautions of cleanliness and thoroughness had been disregarded. In using phosphate cement in setting inlays where there remains only a thin layer of soft dentin over the pulp, it is well to saturate the cavity with carbolic acid, which can be dried out after a few minutes, when the pulp will be found far less sensitive to the irritating action of the phosphoric acid; but, even when this precaution has not been taken, I have never known a pulp to suffer more than a few hours' discomfort from the use of phosphate cement. Usually a cement with a very fine powder and one which does not suddenly crystallize is to be preferred.

The melting of the inlay requires intelligent care, like every other step of the process. The powder should be mixed with absolute alcohol, both for convenience of working and because it evaporates with less disturbance of the particles than water, as well as because there is no danger of its conveying any deleterious substance, as lead for instance, in solution. The powder works so kindly with alcohol that one can pack and melt to the finest edge, or obtain any contour which may be desired, with the greatest certainty. A good eye for form and color is necessary. After a little practice one should be able to exactly reproduce the form of the missing portion of the tooth so as to make unnecessary any shaping of the inlay by grinding.

The selection of the color is often a matter of difficulty. Especially in small inlays it is well to choose a color slightly darker than the tooth in a moist condition, except in approximal cavities, where a lighter color is often indicated. Selecting the color after the tooth has been dried under the rubber-dam is misleading. The inlay must correspond in color to the tooth in its natural, moist condition, and then, in a few weeks after being set, the tooth will have the same appearance as it presents when the inlay is tried in and before it is set in cement, so both operator and patient can know to a certainty, before the filling is set, what its permanent appearance is to be.

When a cavity has been prepared for a gold filling, if the operator at the last moment changes his plan and decides to insert an inlay, he will often be surprised to find, upon reshaping the cavity and giving it straight or flaring walls and obliterating undercuts, that he had left, in the first instance, some minute particles of decay or softened dentin which, under the less free opening designed for the gold filling, had escaped his observation. You have all felt the chagrin which occasionally comes to every dentist at discoloration under a mechanically perfect gold filling, but such an annoyance, for the above as well as for other reasons, is not attendant upon inlay work.

To be sure, the operator, in the beginning at least, must be prepared to give this work more time, cavity for cavity, than is necessary to his more accustomed method of gold filling, but he will find the work less exhausting, more remunerative, and far more satisfactory. Last of all, if the testimony of the patient is to be accepted, inlay work is incomparably more merciful. Nearly all patients who are not insensible to pain and physical discomfort declare, having once experienced the difference between the two methods, that they will never again submit to the torture of the mallet and the sensitiveness to changes of temperature which accompany gold work in any case where an inlay is practicable, and its practicability is almost universal.

Porcelain enamel has a wide field of usefulness in crowns and pivot teeth. It adheres fairly well to platinum, but, of course, in building up crowns it should usually have some support from pins also. The most beautiful work can be done with its aid in pivot teeth, and where roots are banded the visible portion of the band can be covered, to great advantage, either with gum color or with the color of the tooth itself. In melting upon porcelain teeth, however, care should be taken to melt the porcelain enamel gently and only just sufficiently to accomplish the purpose, that the expansion should be as slight as possible. This precaution, and slowness in cooling also, are only necessary when American teeth are used. Porcelain enamel has a far greater affinity for English teeth, to which it attaches itself so naturally that there is little fear of cracking in cooling. By its means the color of a pivot tooth can be perfectly preserved, or, if desirable, a slight lightening or darkening of the shade of the tooth can be easily obtained.

The process of manufacture is a complicated and difficult one, so that the material is relatively expensive, but its original cost is a matter of no consequence in comparison to its usefulness. Arrangements have been made to supply the American demand, and I feel confident that all of you who adopt this method will find it as advantageous to yourselves as it will surely be to your grateful patients.

DENTAL ARTICULATION AND OCCLUSION.

BY WM. ERNEST WALKER, D.D.S., PASS CHRISTIAN, MISS.,

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(Read before the National Dental Association, August 1, 1899.)

THE teeth have two articulations and also an occlusion; first, the dento-alveolar articulation, of the classification *synarthrosis,* of the variety *gomphosis;** second, the interdental articulation, a gliding movement of the lower upon the upper teeth; an articulation which, because of its great mobility, might be classed as *diarthrodial* but for the lack of synovial fluid.

In extremely rare cases the temporo-mandibular articulation appears to be a true hinge joint,—ginglymoid. I have met with but one perfect example of this condition, in which case there was no interdental gliding, and hence no interdental articulation. The teeth could only be occluded cusp to sulcus, the patient being unable to protrude the mandible or to triturate. This condition appears to be so extremely rare, however, that it may be classed as abnormal, there being as a rule more or less lateral and protrusive movement of the mandible, which causes the interdental gliding, an important consideration in the arrangement of cusps not only in prosthesis, but in orthodontia, in contour operations, and in peridental diseases.

Occlusion is the mere coming together of the teeth, principally cusps to sulci.

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*This, though it is the accepted classification, is not absolutely correct, as there is a slight, though very essential, degree of movement in the dento-alveolar articulation,—not sufficient to be classed as *amphyarthrosis*, but too great to be strictly classed as synarthrosis; the classification is, however, as nearly accurate as our present nomenclature permits.

It would seem to be unnecessary to call attention to facts which have been long recognized were it not that changes in the nomenclature of this subject have been suggested and recommended, and by a few writers adopted, though not, as will presently be shown, accepted by the profession at large.

The suggestion or recommendation to which I have reference is that the term *articulation* be used only in its strictly anatomical sense in connection with the teeth,—that is, as describing the relationship of the teeth to their alveoli; the term *occlusion* to be used in reference to the relationship between antagonizing teeth, to the exclusion of the term articulation in this connection.

In the DENTAL COSMOS, December, 1896, pp. 1023 and 1036, may be found two lists of words the discontinuance of the use of which has been recommended, together with the words advised as substitutes. Among the condemned terms are found canine, eye tooth (cuspid), sixth-year molar, twelfth-year molar, wisdom tooth (first, second, and third molars), peridentium and periosteum (pericementum), fang (root), gum-boil (alveolar abscess), nerve (pulp), articulation (occlusion), and others. I also quote from the DENTAL COSMOS, December, 1897, p. 1026, as follows: "The articulation of the teeth, in anatomical parlance, is their relationship with their alveoli. For a long period dentists had applied the same term to express the contact relationship between the upper and lower teeth, thus having the same word to express two entirely different things. Recognizing the confusion which arose from this double application of one word, the term 'occlusion' was suggested and adopted to express the relationship between antagonizing teeth." The writer quoted also speaks of "the almost universal acceptance of these meanings of the words," but our dental literature, both journalistic and standard, fails to afford proof of any general acceptance of the application of the term articulation as thus restricted.

"The relationship between antagonizing teeth" presents itself in several widely varying aspects, more entirely different each from the others than are the two conditions of dental articulation, and the "confusion" arising from the "double application" of the term articulation becomes "confusion worse confounded" in the proposed use of the term occlusion. For, while the word articulation may be so modified by compounding, as in the terms dento-alveolar articulation, interdental articulation, etc., as to indicate clearly the idea sought to be conveyed, we have not that resource in the use of the term occlusion; while the latter is clearly applicable to the position of the teeth when the mouth is closed and the teeth brought together, cusps to sulci, the cusps interlocking on both sides simultaneously, it would require a multiplicity of adjectives to adapt the term occlusion to the expression of all the different positions the teeth may assume in the lateral and protrusive excursions of the mandible in the function of mastication. In the effort to escape a minor difficulty we encounter one much greater.

I have therefore thought it advisable to bring the question before the National Dental Association, through this section, that we may consider the advisability or otherwise of recommending for final adoption this proposed change in a long-established nomenclature. The generality of writers use the words articulation and occlusion in reference to the teeth with the specific meaning applied to them by Dr. W. G. A. Bonwill in his well-known treatise on "The Geometrical and Mechanical Laws governing the Articulation of the Human Teeth," from which I quote as follows:* "If there was but one movement to the lower jaw, and that up and down, we might possibly say *occlusion*. But this term applies more properly to the shutting of the lips or the closing of the mouth, and not to the motions of the lower jaw dependent on the articulation at the glenoid cavity, where the articulation is universal. Articulation is a word of action throughout, while occlusion answers to the mere act of closing the teeth and lips and keeping them closed; one is active, the other passive."

Articulation, as thus used, refers to the function and motions of the jaw, and denotes the position of the cusps of the teeth in the incisive function; occlusion denoting the position of the teeth when they are brought together in the position of rest, the upper and lower cusps interlocking on both sides simultaneously. In the "American Text-Book of Prosthetic Dentistry" Dr. Molyneaux uses these words (p. 346): "The lower jaw has only one position of complete occlusion, and that is when both condyles are resting in the glenoid fossæ and the mouth is closed."

The positions in articulation, on the other hand, are various, as, first, when the upper and lower buccal cusps are in contact on either one side or the other; second, when the morsal surfaces of the incisors are in contact; third, when the jaw and teeth are gliding from the above positions to the position of occlusion.

In occlusion the teeth have a much greater amount of surface contact than in any position of articulation, the buccal cusps of the mandibular bicuspids and molars of both sides fitting into the sulci of the maxillary bicuspids and molars; in the majority of cases, also, in occlusion, the labio-morsal margins of the mandibular cuspids and incisors touch the lingual surfaces of the maxillary cuspids and incisors.

That the term occlusion is not deemed all-sufficient for expressing the various phases of relationship between the antagonizing surfaces of the teeth is evidenced by the continued use of the word articulation in this connection by our best writers, not only in our periodical literature, but more especially by the most recent authority in this line, "The American Text-Book of Prosthetic Dentistry." Dr. Essig, the very able editor of the volume, refers to Dr. Bonwill's system of articulation, and uses the words occlusion and articulation in the sense given them by Dr. Bonwill in his several chapters on "Molding and Carving Porcelain Teeth," on "English Tube Teeth," and on "Vulcanized Rubber." For instance, of porcelain teeth he says they must be so designed with reference to occlusion that they will, when articulated and adjusted to the mouth, perform the function of mastication with some degree of satisfaction to the patient (p. 225). Of English tube teeth he says they must be fitted to both the plate and the bite, lest on articulating they be found too short (p. 434). In the chapter on vulcanized rubber he says the articulation, properly so called, is taken in the mouth, the mouth being the true articulator (p. 484). Again, in cases of fracture of the lower jaw, he says the articulation is corrected by adjustment to the upper teeth (p. 548).

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*Reprint from Harris's "Principles and Practice," 12th edition, page 2.

Dr. H. H. Burchard, who revised the proof sheets and who contributes largely to the volume, uses the word articulation in the good old-fashioned, but condemned, way not less than four times in fifteen consecutive lines (p. 661) in his chapter on "Selecting and Fitting the Teeth." For instance, he says, "The lower teeth are now fitted to the plate, articulating with the upper teeth." He speaks of "the articulating relations existing between the upper and lower teeth" in full artificial dentures as being the reverse of those existing in the natural teeth, etc. In his chapter on "Bridge-work" the words are frequently used in the same sense, as, for instance, we are told that the teeth should be so articulated as to restore the lost masticating surfaces (p. 661); to get the articulation with cusp-buttons (p. 665); the articulating faces of a bridge (p. 671); a certain method is given as being designed to "secure increased accuracy of articulation" (p. 662), the result, however, being called "an accurate occlusion," the two terms being thus used as synonyms. Not to further burden my pages with quotations from this work, I will only add that the word articulation is used with reference to the antagonizing surfaces of the teeth by Dr. Goddard in his chapter on "The Principles of Metal Work;" by Dr. Molyneaux in the chapter on "The Bite or Occlusion;" by Dr. Ambler Tees in the chapter on "Continuous-Gum Dentures," and by Dr. W. W. Evans in the chapter on "Celluloid or Zylonite." Dr. A. H. Thompson, in the chapter on "The Temperaments," devotes a column in his table of temperamental characteristics of the teeth to their articulation other than dento-alveolar. In short, with the single exception of Dr. Ottolengui, whose subject, "Palatal Mechanism," affords no opportunity for the use of the word articulation, every author in this recent volume, made up of contributions from the most eminent authorities, and recommended by the Committee on Text-Books of the National Association of Dental Faculties, quite ignores the suggestion or recommendation of the discontinuance of the use of the word articulation otherwise than with "its true anatomical significance."

Dr. E. S. Talbot, in his latest work, "Interstitial Gingivitis," just from the press (July, 1899), uses the word with reference to the masticating surfaces of the teeth.

It was also used in that connection by Dr. V. H. Jackson in a paper read before this association at Omaha (see Trans. N. D. A., 1898, pp. 187, 196, 197); also by Dr. H. H. Johnson at the meeting of the Southern Branch, St. Augustine (*ibid.*, p. 363).

Although small space is given to prosthesis in our dental journals, yet the issues of the leading periodicals for the last few years, or since the agitation of this question, do not show any marked discontinuance of the use of the word in the sense contended for, or of the use of the word occlusion except where a true occlusion is intended, as defined by Dr. Bonwill, Dr. Molyneaux, and, more recently, by Dr. C. S. Butler.[*]

As reported in the *International Dental Journal,* 1898-99, we find the word used in this sense in papers and discussion of the Academy of Stomatology (Philadelphia), the Institute of Stomatology (New York), the American Academy of Dental Science (Boston), the Northeastern Dental Association, the Section on Stomatology of the American Medical Association, by Drs. R. R. Andrews, Robt. Huey, Geo. S. Allan, G. Lenox Curtis, R. H. M. Dawbairn, E. A Bogue, W. J. Younger, and others.

As reported in the DENTAL COSMOS, we find it used in the First, Sixth, Seventh, and Eighth District Dental Societies of New York, in the New York Odontological Society, in the Dental Society of the State of New York, in the tri-state meeting of the Maryland, Virginia, and Washington City Dental Societies; by Drs. Hofheinz, Root, Beebee, Holmes, Sweetser, J. T. Codman, Sweeny, C. S. Butler, F. A. Greene, Eschelman, S. G. Perry, C. W. Stainton, and by Dr. Moriarty, instructor in the Dental School of Harvard University, and others; and in the American Dental Society of Europe by Drs. W. Mitchell, Daboll, Stallman, I. B. and W. S. Davenport.

As reported in the *Dental Review,* we find it used in the Illinois State Dental Society, the Chicago Dental Society, the Hayden Dental Society, and the Minnesota State Dental Society; by Drs. C. S. Case, Nyman, Morey, F. F. Fletcher, Haskell, Ottofy, and others.[†]

If a student is taught that the word *articulation,* as used in dentistry in application to the teeth, has reference strictly and solely to the relationship existing between the teeth and their alveoli, and with this understanding reads, say Dr. Bonwill's classic paper on "The Laws Governing the Articulation of the Human Teeth," or Dr. I. B. Davenport's celebrated paper on "The Dental Arches of Man," and the numerous reviews, essays, and discussions which this paper has called forth, how meaningless they would appear to him. Give him the "American Text-Book of Prosthetic Dentistry" to study, with the understanding that the word articulation, wherever used with reference to the teeth, applies exclusively to their alveolar articulation, only the word occlusion applying to the antagonizing surfaces, and how incomprehensible much of the instruction given would be. Very much of our literature would require to be rewritten were this rule to be enforced.

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[*] DENTAL COSMOS, February, 1899, page 176.

[†] For the above and other instances of the continued use of the word articulation with reference to the antagonizing surfaces of the teeth, see *International Dental Journal*, 1898, June, page 407; September, page 608: October, page 692; November, page 742. 1899, January, page 36; February, page 103; April, page 262; May, page 342; June, page 348; July, pages 459, 462, 464. DENTAL COSMOS, 1898, January, page 81; February, pages, 115, 163; March, pages 200, 240; July, pages 551. 552; August, pages 665, 673; September, page 762; November, pages 920, 933, 934, 947; December, pages 1010, 1024, 1025. 1899, January, pages 81, 97; February, pages 175, 177, 178, 179; March, pages 280, 286; June, pages 525, 546, 577, 578, 579, 580, 581, 583, 592; July, pages 647, 669. *Items of Interest,* 1898, February, pages 90, 96; October, pages 727, 728; December, pages 890, 899. 1899, January, pages 22, 24; March, pages 161, 190, 192; April, page 294. *Dental Review*, 1898, January, page 48; February, pages 80, 85, 147; May, page 370; August, page 627; September, pages 663, 671, 676. 1899, February, page 106; July, pages 554, 574. *Dental Digest*, 1898, March, pages 157, 158; July, pages 441, 456; November, page 773. *Ohio Dental Journal,* 1899, March, page 143; April, page 206; May, page 250.

Would it not simplify the matter to restrict the use of *the single word* articulation to those surfaces the articulation of which most nearly concerns us, reserving the more cumbrous descriptive compound term "dento-alveolar articulation" for less frequent use; an economy both of space in writing and of time in speech?

As it is always undesirable to make radical departures from long-established usage, unless very decided advantages are apparent, and as the words articulation and occlusion have been long used in a clearly-defined and specific sense, not only by Dr. Bonwill and his students and adherents, but also by many others of the most prominent men in our ranks, it would seem advisable to continue to use them in that specific sense, at least until two equally distinctive but better terms are offered us by which to indicate the two radically different phases of relationship between antagonizing teeth, which Dr. Bonwill has called "articulation" and "occlusion."

This view is quite in harmony with the reasoning of the Committee on Nomenclature of the American Dental Association, who, in the discussion of their report in 1895, in rejecting Dr. G. V. Black's proposed substitution of the name "occluding-frame" for the familiar term "articulator," argued in favor of the continued use of the old name, as follows: "*First,* because of its long usage; *second,* because it is a single word; *third,* because it is a word that is more suggestive of the operation to be performed;" adding, "and we cannot see that it will in any manner interfere with the nomenclature of the dental anatomy."* The name *articulator* does not suggest *an occlusion,* although the accepted definition of the verb "to occlude" given by Dr. Black is "to strike against, as the articulation of the upper with the lower teeth."† In the report for 1896 (p. 130) an articulator is defined as "an apparatus for obtaining the correct occlusion of sets of artificial teeth." The rejected term, "occluding-frame," would be more in harmony with this definition. If mere *occlusion* was our only concern our work would be greatly simplified, but much more is implied in *articulation.*

It is unfortunately true that the terms have been used interchangeably, or as synonyms, by a few writers, and it is the erroneous use of the words that I hope the section and the National Association will condemn, and recommend that the word "occlusion" be used to indicate the impact of the mandibular against the maxillary teeth, cusps to sulci, in the position of rest; and that "articulation," without any modifiers, serve to indicate the contact of the incisors edge-to-edge, and of the molars and bicuspids cusp to cusp, and the gliding from the latter positions to that of occlusion.

Until some erudite scholar shall supply us with two new terms, free from the objectionable double application of those we have, and more than partially expressive, the old terms may well continue to serve our purpose as they have done in the past, though it is to be desired that proper discrimination shall be made by the few who have occasionally used them as synonyms.

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*Trans. American Dental Association, 1895, page 123.

†Ibid., page 112.

CORRESPONDENCE.

TREATMENT OF DECIDUOUS TEETH.

To the Editor of the Dental Cosmos:

Sir,—In the May issue of the Dental Cosmos appears a "Symposium" of the Maryland State, the Washington City, and the Virginia State Dental Associations, at which the subject, "What are the Best Materials for filling Children's Teeth?" was discussed. These papers contain so many statements which are out of harmony with the histological studies in which I have been interested for several years that I feel that I cannot let them pass unnoticed.

While Dr. Truman's statements in the third paragraph, page 417, may be in a general way correct, as they are given they are entirely misleading and misrepresenting to the profession at large. It is true that "the normal development of dentin has not been completed when the entire external formation of the tooth has been fully formed;" but the continued development produces changes of amount, not of character; the layer of dentin grows thicker, but the character of that which is formed does not change. The physical and chemical as well as the histological study of the teeth shows that the changes in the character of the tissue, if any, must be very slight indeed. The dentin matrix is formed and calcified under the direct supervision of the odontoblasts, not the fibrils, which are left imbedded in the formed dentin. The calcified dentin does not change perceptibly after it is once formed. We will say that at a certain time the wall of dentin is only half as thick as it will be later, but that which is already formed is perfectly formed and is as capable of holding a gold or any other kind of filling as it will ever be.

Dr. Truman says, "The so-called tubes have a much larger diameter . . . " All of the work which I have done goes to show that the change in the diameter of the dentinal tubules, if any, is very slight indeed, and would require the most careful and accurate measurements to determine the amount.

In regard to the enamel, Dr. Truman's statement would be correct if he would leave out one word and make it read (page 418), "The enamel . . . may be regarded as a (an almost) finished tissue when fully formed, differing in this respect from the dentin."

Dr. Truman says, "It must be recognized by all practitioners that the histological character of the tissues of the teeth varies with age." This statement I would challenge. The profession has the right to demand that such statements as this be supported by proof. If there is a change in the diameter of the tubules in young and old teeth, what is the amount of the variation and upon what set of measurements does he base the statement? The time has come when such statements must be accompanied with the data from which they are made; they must be enforced by the tabulated measurements upon which they are based, and illustrated by photomicrographs; without such ground they are simply Dr. Truman's dicta, not histological facts.

Clinically I do not agree with the doctor either. I have a good many gold fillings in my own mouth which were made by my father before I was twenty years old. None of them have been replaced and none of the teeth have given the slightest trouble since they were filled. Among these fillings are several large compound cavities in first molars that were filled with gold before I was fourteen years old. I could mention another case where large compound cavities in first molars of a boy of eight were filled with gold by one of the best known men in the profession, the patient being his son. The man is now over twenty-six years of age. I have seen these fillings within a few months and they were in perfect condition. By reference to my father's records I could show that these are not exceptions to the rule where gold fillings have been made for children in his practice.

As a principle of practice it is undoubtedly often better to make temporary operations for children, for many reasons, but among these histological changes in the character of the dentin do not appear as a factor.

It is often impossible for children to endure the strain of permanent operations without positive damage to their nervous systems and courage, and, as Dr. Truman says, we cannot work on the teeth without reference to the individual as an entire organism. The thick and vascular peridental membranes of young teeth contain relatively few fibers and many cells, and will not endure as much strain or mallet force as the adult membranes. Hence the value of the gnatho dynamometer in determining the strength of the membranes or how much force they have become accustomed to.

In operating for young people, the thinness of the mass of dentin must constantly be borne in mind. Often it is better to make a temporary filling of some non-conducting material until the odontoblasts have completed the formation of dentin and protected the pulp. It is also true, however, that the pulps in young teeth have much more vitality before their function is completed than they have later, and consequently will tolerate metal fillings which are separated from them by only a thin layer of dentin better than they will after the normal formation of dentin is completed, the new formation of dentin rapidly interposing a non-conductor of natural origin. Of course, unless the filling is perfectly tight, the pathological conditions of the cavity are in nowise altered.

To my mind the advantages of tin over gold are entirely due to its physical properties mentioned by Dr. Ambler, and the resulting fact that it can be packed much more easily and rapidly than gold and still make a perfectly tight filling that will preserve the tooth until worn out by use.

The second paper, by Dr. Sidney S. Stowell, of Pittsfield, Mass., contains one of the oldest and best beloved delusions of the dental profession, namely, that decalcified dentin left in the bottom of a cavity may become recalcified by natural processes. There is not a single scientific demonstration to support this idea. It is not the dentinal fibrils which form or calcify the dentin; it is the odontoblastic cells. The fibrils are simply left behind in the formed tissue; they have no more power to form or re-form or recalcify the tissue than the bone corpuscles or their branches, which fill the lacunæ and canaliculi of the bone, have power to form bone-matrix around themselves. Aside from this, it has often been pointed out that this softened material may often contain products of microbic life which are not affected by disinfectants and are very poisonous to the pulp if left inclosed in the cavity.

FREDERICK B. NOYES, D.D.S.

CHICAGO, ILL.

THE "DELTA" ORGANISM OF MILLER AS A FACTOR IN DENTAL CARIES.

TO THE EDITOR OF THE DENTAL COSMOS:

Sir,—A controversy has arisen in the pages of the DENTAL COSMOS between Dr. W. C. Barrett and myself on account of a statement drawn from me by Dr. J. E. Hinkins, to the effect that Dr. W. C. Barrett considers the *"Delta" organism of Miller* as the chief factor in decay of the teeth, while Miller himself attaches little importance to this organism.

I based my statement on the following paragraph from Dr. W. C. Barrett's work on "Oral Pathology and Practice," pages 71 and 72:

> "The various foods, especially the starches, will by the action of the ferments of the mouth be changed into forms admirably adapted to the growth of the acid-forming bacteria. Of some of these Miller made cultivations, analyzing their by-products, and he found, as the result of the proliferation of *one special organism, lactic acid.* Further observation enabled him specially to point out the exact method by which caries is produced, which is as follows:
>
> "In the sulcus of a tooth, or between two teeth, or in any pit or irregularity of its surface, food lodges. By the action of some ferment this is perhaps changed into sugar. This forms a suitable medium for some of the bacteria, and it is perhaps at once infected with the *'Delta' organism of Miller.* In its growth this splits up the fermentable sugar, building into its own substance such elements as are necessary for it, and leaving the remainder to form new combinations, or by-products, one of which is *lactic acid,"* etc.

Now, I leave it to the unbiased reader to decide whether this paragraph justifies my statement regarding Dr. W. C. Barrett's view of the *Delta* organism.

If it does not, then I owe Dr. W. C. Barrett an apology for misinterpreting him. If it does, then Dr. W. C. Barrett owes me an apology.

The whole incident did not arise through a desire on my part to criticise Dr. W. C. Barrett, but was brought up incidentally, intended to correct a misleading statement made by Dr. J. E. Hinkins.

Yours very truly,
E. Lawley York.

Koniggratzer-Str. 140, Berlin, Germany, July 21, 1899.

PROCEEDINGS OF SOCIETIES.

NATIONAL ASSOCIATION OF DENTAL FACULTIES.

The sixteenth annual session of the National Association of Dental Faculties was held in Niagara Falls, commencing Friday, July 28, 1899.

The following colleges were represented, as noted:

Birmingham Dental College, Birmingham, Ala.—T. M. Allen.

University of California, Dental Department, San Francisco, Cal.—A. A. d'Ancona.

Colorado College of Dental Surgery, Denver, Col.—J. S. Jackson.

University of Denver, Dental Department, Denver, Col.—A. H. Sawins.

Columbian University, Dental Department, Washington, D. C.—J. R. Hagan.

Howard University, Dental Department, Washington, D. C.—A. J. Brown.

National University, Dental Department, Washington, D. C.—A. D. Cobey.

Atlanta Dental College, Atlanta, Ga.—H. R. Jewett.

Dental Department of Atlanta College of Physicians and Surgeons, Atlanta, Ga.—Frank Holland, S. W. Foster.

Chicago College of Dental Surgery, Chicago, Ill.—Truman W. Brophy.

Northwestern University Dental School, Chicago, Ill.—Theo. Menges.

Indiana Dental College, Indianapolis, Ind.—George E. Hunt.

State University of Iowa, Dental Department, Iowa City, Ia.—W. S. Hosford.

Louisville College of Dentistry, Louisville, Ky.—H. B. Tileston.

Baltimore College of Dental Surgery, Baltimore, Md.—M. Whilldin Foster.

University of Maryland, Dental Department, Baltimore, Md.—John C. Uhler.

Boston Dental College (Tufts College Dental School), Boston, Mass.—Chas. P. Thayer.

Harvard University, Dental Department, Boston, Mass.—Thomas Fillebrown.

College of Dental Surgery of the University of Michigan, Ann Arbor, Mich.—J. Taft, N. S. Hoff.

Detroit College of Medicine, Dental Department, Detroit, Mich.—G. S. Shattuck.

University of Minnesota, Dental Department, Minneapolis, Minn.—W. P. Dickinson.

Kansas City Dental College, Kansas City, Mo.—J. D. Patterson.

Western Dental College, Kansas City, Mo.—D. J. McMillen.

Marion-Sims College of Medicine, Dental Department, St. Louis, Mo.—J. H. Kennerly.

Missouri Dental College, St. Louis, Mo.—A. H. Fuller.

University of Omaha, Dental Department, Omaha, Neb.—A. O. Hunt.

University of Buffalo, Dental Department, Buffalo, N. Y.—William C. Barrett, R. H. Hofheinz.

New York College of Dentistry, New York city—Faneuil D. Weisse.

New York Dental School, New York city—John I. Hart, Roderick M. Sanger.

Cincinnati College of Dental Surgery, Cincinnati, O.—G. S. Junkerman, W. T. McLean.

Ohio College of Dental Surgery, Cincinnati, O.—H. A. Smith.

Western Reserve University, Dental Department, Cleveland, O. —H. L. Ambler.

Ohio Medical University, Dental Department, Columbus, O.—Otto Arnold.

Pennsylvania College of Dental Surgery, Philadelphia, Pa.—Wilbur F. Litch.

Philadelphia Dental College, Philadelphia, Pa.—S. H. Guilford.

University of Pennsylvania, Dental Department, Philadelphia, Pa.—James Truman, Edward C. Kirk.

Pittsburg Dental College, Pittsburg, Pa.—Walter H. Fundenburg.

School of Dentistry, Central Tennessee College, Nashville, Tenn. —G. W. Hubbard.

University of Tennessee, Dental Department, Nashville, Tenn.—L. G. Noel.

Vanderbilt University, Dental Department, Nashville, Tenn.—Henry W. Morgan.

Tacoma College of Dental Surgery (*North Pacific Dental College*), Portland, Ore.—Geo. H. Chance.

Milwaukee Medical College, Dental Department, Milwaukee, Wis.—Geo. V. I. Brown.

Royal College of Dental Surgeons of Ontario, Toronto, Canada—J. B. Willmott.

The treasurer reported that the Dental Department of Tennessee Medical College, of Knoxville, Tenn., was no longer in existence, having been absorbed by another school.

The Tacoma College of Dental Surgery, having removed to Portland, Ore., was given authority to change its name to North Pacific Dental College.

The trustees of Boston Dental College accredited Dr. C. P. Thayer as delegate to explain to the association that they had transferred the institution, with all its appurtenances, to Tufts College, and to request that the Tufts College Dental School be permitted to make application for membership at this meeting. On motion it was ordered that Tufts College Dental School be accepted as a continuance of the old college, and that the change of name be approved.

The applications for membership of the following schools, having been reported as regular by the Executive Committee, lie over for one year for final action:

Medico-Chirurgical College of Philadelphia, Dental Department, Philadelphia, Pa.

Central College of Dentistry, Indianapolis, Ind.

College of Dentistry, University of Southern California, Los Angeles, Cal.

Illinois School of Dentistry, Chicago, Ill.

Washington Dental College and Hospital of Oral Surgery, Washington, D. C.

Keokuk Medical College, Dental Department, Keokuk, Ia.

The Committee on Text-Books reported recommending that the following be adopted: "Anatomy and Histology of the Mouth and Teeth," by I. N. Broomell, D.D.S.; "The Practice of Dental Medicine," by Geo. F. Eames, M.D., D.D.S.; "Comparative Dental Anatomy," by A. H. Thompson, D.D.S. (recommended last year in proof); "Methods of Filling Teeth," second edition, by R. Ottolengui, M.D.S.

The committee had also examined "Chemistry and Metallurgy Applied to Dentistry," by Vernon J. Hall, Ph.D.; and while admirable, and containing many excellent features, the committee believed it unwise to recommend it as a text-book, inasmuch as there are already two excellent works on the same subject on the list.

Of "Interstitial Gingivitis, or so-called Pyorrhea Alveolaris," by Eugene S. Talbot, M.D., D.D.S., the committee reported that it contained evidence of laudable and extensive research, but the subject is still a matter of so much controversy and diversity of opinion as to make undesirable a text-book upon it at the present time.

The committee also suggested the removal of Clifford's "Manual of Recitations," adopted in 1892, and Burchard's "Compend of Pathology," adopted in 1897.

The following resolutions, laid over under the rules from 1898, were adopted:

Offered by Dr. Allen:

Resolved, That it is the sense of this association that the present method of bestowing scholarships is no longer called for, and is detrimental to the best interests of the profession, and that hereafter no college of this association shall grant either free or beneficiary scholarships not absolutely made obligatory in their charter.

Offered by Dr. Barrett:

Resolved, That it shall be the duty of the secretary of this association to present at the opening of each annual session a list of the colleges, members of this association, who have been unrepresented for two years, that proper action may be promptly taken.

The resolutions of Drs. Allen and d'Ancona concerning the attendance of students were substituted by the following, offered by Dr. Willmott, which was adopted:

Resolved, That students in attendance at colleges of this association, to obtain credit for a full term, must be and remain in attendance until the close of the session.

In accordance with this action, Rule 4 was amended to read as follows:

4. In cases where a regularly matriculated student, on account of illness, financial conditions, or other sufficient cause, abandons his studies for a time, he may re-enter his college at the same or a subsequent session, or where, under similar circumstances, he may desire to enter another college, then with the consent of both deans he may be transferred.

Rule 9 was amended to read as follows:

ADMISSION OF UNDERGRADUATES OF MEDICINE.

9. Undergraduates of reputable medical colleges who have regularly completed one full scholastic year of a six months' term and passed a satisfactory examination in the studies of the freshman year may be admitted to the junior grade in colleges of this association, subject to other rules governing admission to that grade.

The Committee on Conference with the National Association of Dental Examiners reported, as the result of several conferences held with a similar committee from the Examiners' Association, that an agreement had been reached concerning the matters which had been in controversy between the two associations for several years. The report was adopted. [The basis of the agreement, with some account of the difficulties referred to, will be found at the end of this report.]

The following resolution was unanimously adopted:

Resolved, That the thanks of the National Association of Dental Faculties are due to the Chicago College of Dental Surgery for the courage and persistence with which it has maintained what we believe to be a correct principle, and that we regard the placarding as unrecognized and disreputable in the newspapers and otherwise of one of the oldest and best of our professional teaching institutions an injustice that demands complete rectification.

Dr. Barrett offered the following, which were adopted:

Resolved, That the commonly accepted Code of Ethics regulating the conduct of practitioners in their relations with other practitioners be approved and made obligatory upon the dental colleges of this association in their relations with other colleges.

Resolved, That the section of the Code which refers to public advertisements be interpreted to forbid the advertising of the infirmaries of dental colleges in any manner that might be construed to be unprofessional if done by a practitioner.

Resolved, That as dental colleges should in every practicable manner impress the importance of ethical conduct upon their students, and should themselves set a good example in this particular, their public advertisements should be confined to a simple statement of the location of the schools, the date of opening and closing, with any other really essential facts, all details being reserved for the annual announcement, which itself shall not violate the usually accepted ethical tone.

Dr. Taft offered the following:

Resolved, That a Commission, consisting of three persons, be appointed, whose duty it shall be to take cognizance of, investigate, and advise with any parties contemplating the establishment of a new college or the reorganization of an old one.

In the performance of the duties of this commission it shall be competent to take into consideration the following points, viz:

The consideration of any proposed new dental college; taking into account all the circumstances that attach to it; the motive that prompts such an organization; the need for it; the proposed locality; the character and ability of those who propose to conduct it; the sufficiency of the resources that may be available for its establishment, and whether, on the part of the promoters, there is a just appreciation of that which is required for such an institution.

The attainment of full knowledge on these points would enable the Commission to advise wisely.

It would be the duty of this Commission to report to this body at each annual meeting.

The resolution was adopted, and it was ordered that the commission be elected with the other officers.

The following amendment to the constitution was adopted:

Change Article V to read as follows:

Article V. The Executive Committee shall consist of five members, three of whom shall be elected annually; the two receiving the higher number of votes shall hold office for two years each. The Executive Committee shall have power to designate the time and place of meeting, make preparations for same, and transact such other business as usually devolves upon such committee. That five members be elected this session, the two receiving the higher number of votes to serve for two years, the other three for one year each.

On motion of the Executive Committee, it was ordered that colleges making application for membership in this body shall have present a copy of their annual announcement, and that a duly authenticated representative of the school be present at the meeting; without which the application shall not be considered.

It was decided that the change from six to seven months' terms, which goes into effect with the session of 1899-1900, should apply to all students in colleges of the association, even though the students may have previously attended under the six months rule.

On motion of Dr. Barrett, it was ordered that a Committee on Law, to consist of three members, be elected to serve as a standing committee, which shall be authorized to levy such assessments upon the members of the association as may be necessary for the payment of past legal expenses, and such as may accrue in the future in the suppression of the issue of fraudulent diplomas. Such assessments to be lodged with the treasurer, and paid upon the order of the Committee on Law. It was also ordered that all legal matters which may arise in connection with the National Association of Dental Faculties shall be referred to this committee.

The Committee on Foreign Relations, in concluding the report of its work for the year, offered the following resolutions, which were adopted:

Resolved, That the Foreign Relations Committee be instructed to take any steps which they may deem advisable for the putting an end to the issuing of fraudulent and irregular degrees, and to this end are authorized during the coming year to use any funds in the treasury of the association upon the approval of the Law Committee.

Resolved, That the European Advisory Board of the Foreign Relations Committee be and is hereby invited each year to send a delegation to attend the annual meeting of this association, and that such delegation be accorded seats in the meetings of the association, with all the privileges of debate.

Resolved, That no student coming from Europe shall be received by any member of the association until his credentials shall have been approved by the members of the European Advisory Board for the country from which he claims to come.

Resolved, That the Committee on Foreign Relations be authorized to appoint Advisory Boards for countries outside of Europe, whenever in their judgment it is advisable to do so, and report any such action at the next succeeding meeting of this association.

Resolved, That the Foreign Relations Committee be given jurisdiction in all foreign American dental educational matters, subject always to the approval of the National Association of Dental Faculties, to which a full written report shall be submitted annually.

Following are the members of the European Advisory Board, so far as appointed:

Great Britain—Wm. Mitchell, W. E. Royce, and B. J. Bonnell.

Holland and Belgium—J. E. Grevers, Ed. Rosenthal, and C. van de Hoeven.

Denmark, Norway, and Sweden—Elof Förberg.

Italy and Greece—Albert T. Webb, Tullio Avanzi, and A. V.

Germany—W. D. Miller, C. F. W. Bödecker, and — Hesse.

Elliott.

France—J. H. Spaulding, I. B. Davenport, and G. A. Roussel.

Spain and Portugal— — Portuondo, Florestan Aguilar, and — Thomas.

Switzerland and Turkey—L. C. Bryan, Theo. Frick, and Paul Guye.

Japan, China, and India—Louis Ottofy.

Australia and New Zealand—Alfred Burne.

The following resolution, offered last year, was again laid over for another year:

Offered by Dr. Hosford:

Resolved, That a four years' course in a reputable college leading to the degree of A.B., Ph.B., or B.S., or four years of biological work, be accepted as one year's credit in the colleges of this association, subject to other rules governing admission to second year grade.

Resolved, That students matriculated in both a collegiate and dental department of a university, having completed the work of the first year in dentistry during the four year collegiate course, may, on graduation with collegiate degree, be given full credit for one year in colleges of this association.

The following, offered by Dr. Foster, was referred to the Executive Committee, to be reported upon next year:

Resolved, That when a student fails in any part of the requirements for obtaining his final degree, such student must hold over till the next regular course, during which time he may re-enter and remove such conditions by completing his work and can only apply for his degree at the close of term as announced in the catalogue of such school.

The following resolutions lie over under the rules till next year:

Offered by Dr. Barrett:

To change Rule 1 to read as follows:

PRELIMINARY EXAMINATIONS.

1. The following preliminary examination shall be required of students seeking admission to colleges of this association:

a. The minimum preliminary educational requirement of colleges of this association, after the session of 1901-1902, shall be a certificate of entrance into the third year of a high school, or its equivalent, the preliminary examination to be placed in the hands of the State Superintendent of Public Instruction.

b. Nothing in this rule shall be construed to interfere with colleges of this association that are able to maintain a higher standard of preliminary education.

Offered by Dr. Weisse:

Resolved, That Rules 8, 9, and 10 of the Code of Rules be rescinded, and the following be substituted therefor:

That advanced standing to the junior or senior classes of institutions of this association shall only be upon certificate of one or two sessions' attendance, respectively, in an institution belonging to this association.

Offered by Dr. Truman:

Resolved, That members of this association violating the rules of this body shall, upon conviction, be fined not less than one hundred dollars for each offense, or be subject to censure, suspension, or expulsion, at the pleasure of the association.

Offered by Dr. Barrett:

Resolved, That the Executive Committee be instructed that, except under what they shall decide to be unusual or extraordinary circumstances, and which in their report they shall detail to the association, they shall not report favorably any application for the admission of a new college in the following instances:

1. When there has not been actually secured and bought or leased for a term of not less than three years, and fitted up with all required equipments, a sufficiently commodious and convenient building, entirely adequate to the needs of not less than one hundred students. Such equipment shall include not only the laboratories, infirmaries, etc., with proper chairs, benches, and all apparatus required for complete practical dental instruction, but the rooms and fittings necessary for scientific training, with apparatus and equipments necessary for the proper teaching of bacteriology, histology, microscopy, chemistry, and such other scientific studies as should form a part of an advanced dental curriculum of study.
2. When the character and attainments of its faculty, which must already have been named, and a list of the members of which with the respective positions they are to occupy shall be embodied in the application presented, are not such as to give assurance that the school will be conducted in a manner to reflect credit upon the dental profession, and to insure complete and adequate instruction in all branches of a broad dental curriculum of study.
3. When the proposed dental college or department is evidently and unmistakably intended primarily for the purpose of sustaining or strengthening another existing institution with which it is to be allied.
4. When the city or town in which such college is to be located already contains a college, or colleges, for dental teaching, of acknowledged efficiency, liberal character, and ethical standing, sufficient in their opinion for the promotion of the best interests of dentistry and the dental profession.

Offered by Dr. Guilford:

Resolved, That while examinations for progress should continue to be held annually upon the subjects taught during the year, no final examinations shall be held until the close of the third year.

Dr. Taft, from the Committee on Curriculum, submitted as the report of his committee the following:

SCHEDULE OF STUDIES.

FIRST YEAR.	Hrs. Per Wk.	SECOND YEAR.	Hrs. Per Wk.	THIRD YEAR.	Hrs. Per Wk.
Anatomy and Dissection	2	Anatomy, Regional	1	Therapeutics	1
Physiology	2	" Comparative	1	Pathology	1
Chemistry, Inorganic	2	Physiology	2	Surgery, General	1
Chemistry, Laboratory	4	Chemistry, Organic	2	" Oral	1
Dental Anatomy	2	" Laboratory	4	Jurisprudence	½
Prosthetic Technic	10	Metallurgy, Didactic	1	Orthodontia, Didactic	1
Histology, Didactic " Laboratory	4	Metallurgy, Laboratory	2	Orthodontia, Practical	1
Materia Medica		Materia Medica	1	Operative Dentistry	2
		Operative Technic	4	Prosthetic Dentistry	2
		Bacteriology, Didactic	4	Electricity	

FIRST YEAR.	Hrs. Per Wk.	SECOND YEAR.	Hrs. Per Wk.	THIRD YEAR.	Hrs. Per Wk.
Comparative Anatomy		Operative Dentistry, Didactic	2	Ethics	
		Orthodontia Technic	1	History	
		Pathology	2		
		Orthodontia, Didactic			
		INFIRMARY.			
		Prosthetic Dentistry.	5	Prosthetic Dentistry.	6
		Crown- and Bridge-Work	3	Operative Dentistry.	15
				Crown- and Bridge-Work	4

The following were elected officers for the ensuing year: Jonathan Taft, president; B. Holly Smith, vice-president; J. H. Kennerly, secretary; Henry W. Morgan, treasurer; S. W. Foster, J. B. Willmott, executive committee for two years; H. B. Tileston, Theo. Menges (chairman), S. H. Guilford, executive committee for one year; W. T. McLean, J. D. Patterson (chairman), W. S. Hosford, *ad interim* committee; Truman W. Brophy, Edward C. Kirk, Albert H. Fuller, commission on proposed new colleges; A. O. Hunt, Henry W. Morgan, W. C. Barrett, committee on law.

The newly-elected president appointed the following committees: T. M. Allen, W. S. Hosford, W. P. Dickinson, G. S. Shattuck, J. G. Templeton, committee on schools; A. J. Brown, John I. Hart, Thomas E. Weeks, Edward C. Kirk, Thomas Fillebrown, committee on text-books; W. C. Barrett, J. D. Patterson, T. W. Brophy, S. H. Guilford, H. W. Morgan, committee on foreign relations; N. S. Hoff, G. V. I. Brown, committee to secure papers to be read at the next annual meeting; S. H. Guilford, W. F. Litch, N. S. Hoff, A. H. Fuller, C. L. Goddard, committee on curriculum.

The Executive Committee reported that it had decided to adopt the suggestion of Dr. Willmott to convene the next meeting on the day of the adjournment of the National Dental Association, at the same place.

Adjourned to meet at Old Point Comfort, Friday, June 29, 1900.

An important fact in connection with the meeting of the National Association of Dental Faculties was the presence of three of the members of the European Advisory Board of the Committee on Foreign Relations: Drs. Lyman C. Bryan, of Basel, Switzerland; John E. Grevers, of Amsterdam, Netherlands, and William Mitchell, of London, England.

Dr. Grevers, in speaking of the reception to advanced standing of students from foreign countries, probably struck the keynote of the entire situation. He was impressed, he said, with the idea that the foreigner comes to this country to study dentistry for one of two reasons: First, as a graduate, or as one having fulfilled the requirements in his own country, who desires to still further develop his manipulative ability by the acquirement of American methods;

or, second, because he cannot fulfill the requirements in his own country, and hopes to secure something here which will enable him to return home and practice. So that if the applicant from a European country is not supplied with the proper certificates the colleges should be cautious about receiving him to advanced standing.

The proceedings of the late meeting were varied by two pleasant, albeit unusual, incidents.

The first of these was a trolley ride of the members of the association and their friends to Buffalo, twenty-two miles away, and return, as the guests of the Dental Department of the University of Buffalo. Arrived at Buffalo they were taken to the college building, where an ample collation was served, accompanied by several felicitous speeches. The various departments of the college were then inspected and pronounced good, after which the party again boarded the trolley cars and were taken to view the grounds where the Pan-American Exposition is to be held two years hence. Then came the return to Niagara Falls, which was accomplished without incident and without fatigue, every one expressing his gratification over the outing.

The second was of the same nature, but involved a visit to a foreign land. The Royal College of Dental Surgeons of Ontario invited the members of the Faculties Association and also those of the National Association of Dental Examiners to visit the college and view the city of Toronto. In response about seventy-five persons took the train at Niagara Falls for Lewiston, where they boarded the steamer for the journey across Lake Ontario to Toronto. Arrived here a short walk brought them to McConkey's, where a fine collation was served and appropriately disposed of. Tally-hos and carriages then conveyed the party to various points of interest in the city, among others Parliament House, where they alighted and spent a short time admiring its beauty of architecture and internal arrangement and fittings. A short drive brought them to the Royal College of Dental Surgeons of Ontario, where they were assembled in the main lecture room, and speeches of felicitation and good-will followed; after which the visitors circulated through the building, inspecting the equipment of the college and having explained to them the methods of instruction in various branches. It was the universal opinion that the school was admirably equipped for the systematic instruction of students of dentistry. The entrance to the college was tastefully draped with the flags of Great Britain and the United States. From the college the party proceeded to the Foresters' Temple Café, where a second collation was served; after which they were driven to the steamboat landing. As the vessel moved off three cheers for the Royal College of Surgeons were given with a will. The return journey was made without mishap, and the excursionists unanimously declared they had had one of the most delightful outings of their lives.

The members of the dental profession will be glad to learn that the differences existing for some years between the National Association of Dental Faculties and the National Association of Dental Examiners have been reconciled. These differences have been the cause of much friction between the two bodies.

The cause of the trouble was the refusal of the colleges to accept various rules which have crystallized into what is known as Rule 8 of the code of rules, Sections 1 and 2, of the Examiners Association, because the colleges were not consulted in its framing.

The attempted enforcement of this rule recently led to litigation in the state of Wisconsin. The State Board of Dental Examiners of that state refused to admit to registration the diplomas of the Chicago College of Dental Surgery, the Northwestern University Dental School, the Pennsylvania College of Dental Surgery, the Ohio Medical University Dental Department, the Philadelphia Dental College, and others, on the ground that they did not in their preliminary examination come up to the standard established by Rule 8, and demanded that graduates of these institutions presenting diplomas for registration should submit to examination by the board as to their qualifications to practice dentistry.

This contention of the board was resisted by a graduate of the Chicago College of Dental Surgery, who brought mandamus proceedings to compel the board to accept his diploma. The board moved to quash the proceedings, which motion was denied by the court, with leave to the board to file its answer. The answer was filed, and the case was in that condition at the time of the meeting of the two associations at Niagara Falls on the 28th of July, 1899.

With a view to the adjustment of the difficulty committees of conference were appointed by the two bodies, which, after going over the matters in dispute, agreed on the side of the National Association of Dental Examiners to recommend that Rule 8 be rescinded; that all colleges having membership in the National Association of Dental Faculties be placed upon the list of recognized schools, and that all litigation be withdrawn; and on the side of the National Association of Dental Faculties that a new rule governing the preliminary requirements for admission to the college courses should be adopted.

This action was ratified by the associations. The Examiners Association adopted a new Rule 8, Sections 1 and 2 of which read as below, the remainder of the rule being substantially as before:

Rule 8, new Sections 1 and 2:

"Section 1. Colleges desiring recommendation to the state boards by the National Association of Dental Examiners shall make application for such recommendation through the Committee on Colleges, on blanks provided for that purpose. This rule to apply only to schools making application to the National Association of Dental Examiners for recommendation and such schools as may be dropped.

"Section 2. The following preliminary examination shall be required of students seeking admission to colleges recommended by this association. The minimum preliminary educational requirements of colleges of this association for the session of 1900-1901 shall be a certificate of entrance into the second year of a high school or its equivalent, the preliminary examination to be placed in the hands of the State Superintendent of Public Instruction, as adopted by the State Board of Missouri."

The Faculties Association adopted the following rule governing the preliminary educational requirements of students:

"The minimum preliminary educational requirement of colleges of this association for the session of 1900-1901 shall be a certificate of entrance into the second year of a high school or its equivalent, the preliminary examination to be placed in the hands of the State Superintendent of Public Instruction.

"Nothing in this rule shall be construed to interfere with colleges of this association that are able to maintain a higher standard of preliminary education."

The cause of friction being removed, the disputes which have arisen, there is every assurance, will be speedily adjusted and the two bodies will thereafter work in harmony.

SEVENTH DISTRICT DENTAL SOCIETY, STATE OF NEW YORK.

(Continued from page 695.)

FOLLOWING is the discussion of Mr. John Dennis's paper on "The Roentgen Energy To-Day," printed at page 853 of the current number:

Dr. M. E. GRAHAM, Rochester, said he would discuss the paper as if he were addressing a body of physicians, and therefore only from a medical standpoint. To them it was immaterial what the Roentgen rays could be used for outside of the human body. Their interest as physicians and surgeons was limited to the assistance they might get from the rays in determining and treating diseases and injuries; and in thus treating the subject he would talk on the line of his personal experience.

Comparing the coil machine with the static machine, he had found that the former was slow. Exposures required a long time comparatively, and, especially when the patient was a child, it was difficult to keep the little one still long enough to get good results; besides, tubes are often broken with the coil machine, and, as they are expensive, to break two or three made the operation excessively costly. In using the fluoroscope with the coil machine the light was not brilliant enough to give good results, even though the current was so strong as to endanger the breaking of the tube, and, besides, the light varies because the interrupter does not run steadily at all times, and if the coil machine is idle for a time its action cannot be depended upon when needed. On the other hand, with a four-plate static machine you can determine clearly the position of any foreign body in the human frame even in so thick a part as the leg. It is much quicker in its action, and in an experience of several months' frequent use he had not broken a tube.

The question had been brought up by Mr. Dennis about the distance the tube should be placed from the human body. This is very important. Of course, in using the apparatus in experiments on the lower animals, it makes less difference, but there are dangers which we should avoid in our practice. If we wish to apply the Roentgen rays to the head of a person for any purpose we must be very careful, as it is liable to cause a loss of the hair, and when applied to any part of the body is liable to burn the skin, and also may cause the nails to fall out. He was not sure whether these accidents were caused by the action of the X rays or by the action of the current passing outside of the tube. There have been experiments where the bacilli of cholera, diphtheria, and other diseases have been exposed to the X rays for an hour without being affected. It would seem, then, that if the X rays would not affect these bacilli it must be something else which could so profoundly affect the skin, as we sometimes see, as to burn it or to cause the hair and nails to be shed, and this something else must be the current passing outside the tube. When the X rays were first introduced to the medical world it was hoped that they would penetrate the human body and kill any harmful microbes, and thus prevent and cure diseases depending on or arising from them, but so far this hope has not been realized. It will need more tests to prove that any benefit can arise from their use in this line.

In regard to the commission proposed by Mr. Dennis, he believed it would be a protection to the community if such a commission was appointed to prohibit the use of these rays on the human body by any except those familiar with their proper use, though he did not think it necessary the commission should be made up of medical men, but it should be of men of scientific attainments who were familiar with the subject and its dangers.

Mr. Dennis is right in holding that no amateur should expose any part of the living human body to the X ray, and no one should bring the tube nearer than fourteen to eighteen inches from the human body when in action, especially if the exposure lasts more than a very short time. Mr. Dennis has invented a very ingenious device to assist in locating foreign bodies in the human frame.* When looking by means of the X rays for an object, say a bullet, in the human body or a limb, it is very difficult to exactly determine its position, though its radiograph may be very plain, because the rays, when they strike the plate from which they are thrown, diverge in every direction, and the size of the body is apparently increased and its apparent position is not an exact guide to its real position. We therefore need some means to determine its real position in the limb if we are to cut down to it for its removal. His device obviates the difficulty and enables us to know very exactly the position of a bullet or other object imbedded in the flesh. In operating for the removal of a needle or other small article, it is necessary to go very straight for it to avoid unnecessary cutting. He had had great difficulty in such a case in finding a needle till he put the fluorometer, furnished by Mr. Dennis, on the limb, when he found the needle only the thickness of a single fiber of the muscle from where he had cut.

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*Described before this society at their meeting in April, 1897, and reported in the DENTAL COSMOS, June, 1897.

In medical use it has been found that a tumor can be discovered and located by the use of the X rays when properly handled. A powerful machine will send the rays through all soft tissues, tumors, and even through the bones themselves, but with an exposure not too strong even an abdominal tumor may be located, and any fleshy fibroid tumor in any part of the body. Even the heart and its action may be seen, as well as the liver and kidneys.

Dr. Louis A. Weigel, Rochester, said he had been working with the X-ray machine for over two years, and as a result he had decided opinions in favor of the static over the coil machine. He had at first used the latter and broken a number of tubes. He then procured a static machine. With this the life of a tube is unlimited, and, moreover, it apparently grows better with use.

So much has been said about X-ray burns that he did not feel called upon to say anything more except that in his own practice he had never had so much as the slightest flush on the skin, while others who had used the rays had produced the most frightful burns. He thought it was all caused by bringing the tubes too close. He had made exposures on subjects of all ages, from infancy to adults, from thirty seconds to an hour and a quarter. The distance he has the tube from the subject is from eighteen inches to twenty-four inches, and with good tubes he gets every desired detail. He showed a number of radiographs; the best one, showing the bones and heart of a human subject, was from an exposure of twenty minutes at twenty-four inches. There were others from exposures as short as three minutes.

The use of the fluoroscope is unsatisfactory for accurate work; the photographic plate is much better, besides being permanent.

He questioned whether it would be wise to limit radiographic work, by legislation, to experts. There is no doubt that there are dangers in its use; some of the worst burns he ever had to attend to were from the careless use of the X rays. To do useful work the operator must have knowledge of electricity, of mechanics, and of photography, with a good knowledge of anatomy and the differences between normal and abnormal anatomy, the living anatomy and the anatomy of the dead body. In the matter of photography, the plates are subject to certain spots which are unavoidable, and unless the operator could recognize these spots they might be considered abnormal bodies in the organization under examination. There is no doubt that with the X-ray apparatus we are able to locate such things as dead bone and tumors. He had one plate which showed some of the convolutions of the brain.

A few words about the medico-legal aspect of the X ray. It is an open question in the courts whether X-ray photographs can be admitted as evidence in cases. Suppose a man is treated for a broken arm and an X-ray photograph showed what appeared as a rather bad union. It might appear as a bad result of the treatment, though the arm was an exceptionally useful arm under the circumstances. This question will have to be settled before long. He had been called on by lawyers to make X-ray pictures to uphold suits for malpractice, but had always declined.

It seemed quite certain that in cases where the use of the X ray had burned or otherwise injured a human being it was because the tube had been held too close. For this reason he was convinced that not the X rays but the electrical current outside of the X rays was the cause of the injury. The use of the apparatus was dangerous only in the hands of one ignorant of the safe conditions.

Mr. DENNIS, closing the discussion, said that he was gratified by the close attention his paper had received, and by the fact that both of the eminent gentlemen who discussed it agreed with his two propositions, namely, that injury done was by the electrical current, safety being assured when the proper distance was preserved, and that the X rays should only be used on the human subject by those who were experts.

NATIONAL DENTAL ASSOCIATION.

THE second annual meeting of the National Dental Association was held in the ball-room of the International Hotel, Niagara Falls, N. Y., commencing Tuesday, August 1, 1899.

FIRST DAY—*Morning Session.*

The association was called to order at 11 o'clock A.M.; the president, Dr. H. J. Burkhart, of Batavia, N. Y., in the chair.

The proceedings were opened with prayer by Rev. Albert S. Bacon.

The session was devoted to routine business.

The president, calling Dr. B. Holly Smith, of Baltimore, vice-president for the South, to the chair, read the annual address, which will be found at page 817, current issue of the DENTAL COSMOS. It was referred to a committee consisting of Drs. James McManus, Thos. P. Hinman, and L. G. Noel, which reported at a subsequent session, as follows:

The Committee on the President's Address beg leave to make the following report:

We heartily indorse the president's reference to the work of the Committee on the Army Medical Museum and Library, which is our national collection of specimens and literature.

MEMBERSHIP.

We recommend that the changes suggested by the president in reference to obtaining membership in this association be referred to the Committee on Revision of the Constitution.

SECTIONS.

Your committee, following the suggestion of the president to consolidate the sections, recommends that the sections be changed to read as follows:

Section 1. Prosthetic Dentistry (including Crown- and Bridge-work), Chemistry, Metallurgy, and Orthodontia.

Section 2. Dental Education, Literature, Nomenclature, Histology, and Microscopy.

Section 3. Operative Dentistry, Materia Medica, and Therapeutics.

Section 4. Physiology, Etiology, Hygiene, and Prophylaxis.

Section 5. Anatomy, Pathology, and Surgery.

Section 6. Clinics.

This also properly comes before the Committee on Revision of the Constitution.

Publication of Transactions.

With reference to the publication of the transactions of this body, we would suggest that a time-limit of fifteen days, from date of mailing, be allowed for correction and return of proof-sheets by the members. On failure of any member to return said proof-sheets, duly corrected, within the time-limit that the Publication Committee be given full power to either eliminate such matter entirely or publish such parts of said matter as they may deem proper.

Committee on Journal.

We recommend that this committee be relieved of further duty and given the thanks of the association.

Ownership of Papers.

See Article IX, Section 5, of the Constitution and By-Laws. This covers the question, and vests the right of ownership in this association.

Executive Council.

This subject has been reported by a special committee, which report is now under consideration by this association.

Discussion of Papers.

We indorse the president's suggestion to reduce the time-limit, and recommend that ten minutes be allowed for opening and five minutes to each member for discussion.

Scientific Bureau.

Your committee would indorse the suggestion of the president that a scientific bureau be established, and that he appoint a committee of three, to report at this meeting, to suggest ways and means of establishing such a bureau.

Indorsement of Proprietary Preparations.

The committee believe that this is fully covered by the Code of Ethics, when it distinctly states that it is unprofessional to indorse nostrums.

Revision of the Code.

Your committee heartily indorses the president's reference to the revision of the code, and asks for the serious consideration of this matter when the report is presented by the special committee.

ARMY AND NAVY.

We recommend the appointment of a committee at large to act in accord with the present one (on the appointment of dentists in the army and navy); said committee to consist of one member of this association from each state, and it shall be their duty to urge upon their Congressmen and Senators the importance of dentists in the army and navy.

In reference to the report of Drs. Donnally and Finley, we do not entirely agree with them, "that we should work for status only," but recommend that this association work for the admission of dentists into the army and navy and then for their status.

We think that the above covers the report of Drs. Donnally and Finley, and recommend that they be thanked for their past services and be continued on this committee.

It has been suggested to your committee that the National Dental Association make an appropriation to defray the expenses of the active members of this committee.

UNIFICATION OF DENTAL LAWS.

Unification is greatly desired. Failing in this, we should work to the end that one examination by a State Dental Board should entitle a dentist to practice in all the states in the Union.

We also recommend that a committtee, composed of one man from each state, be appointed to further such unification.

LIFE INSURANCE EXAMINATION, ETC.

We recommend that the president, at his discretion, appoint a committee in reference to life insurance examination and the enlightenment on dental subjects of the various educational institutions.

We heartily indorse the elevating sentiments expressed in the closing paragraphs of the president's most estimable address.

Respectfully submitted,
JAS. MCMANUS, *Chairman;*
THOS. P. HINMAN, *Secretary;*
L. G. NOEL.

The report was adopted.

The Committee on the Appointment of Dentists to the Army and Navy presented the following report, through Dr. M. F. Finley, of Washington, D. C., chairman, which was referred to the Committee on the President's Address:

TO THE NATIONAL DENTAL ASSOCIATION:

The matter of this association promoting legislative provision for the appointment of dental surgeons to serve those engaged in the military and naval defense of our country was introduced at our Omaha meeting, and not only failed to call forth enthusiastic indorsement, but the agitation and discussion of the subject were deprecated by some of our most judicious members.

It was, however, later agreed to refer the subject to a committee, with instructions to report to this meeting. Immediately upon our appointment as members of this committee we began a diligent and painstaking inquiry, commencing with a number of the members present at that meeting and continuing until the views of a large number of representatives of the profession in America were obtained. With but a single exception, every one whose name you would recognize agreed that, so far as the honor and dignity of our profession are concerned, it were better that there should be no legislation on the subject than that there should be legislation placing the army and navy dental surgeon in a position, relatively to the army surgeon, inferior to that accorded to his profession relatively to the medical profession by the state universities, by legislative and judicial pronouncement, and by the public estimate of the status of the educated specialist of any branch of the healing art. This phase of the subject concerned your committee more than all else connected with it; not that we nor those we represent are personally wanting in humane feeling for the self-sacrificing men of our army and navy (whose ever-present need of the dental surgeon's service is increased many-fold by their extraordinary hardship in foreign lands beyond the reach of such service), but because we could not believe the dental profession would sanction the legalizing of an invidious distinction between the army surgeon and the specialist, knowing as we do that the unpleasant consequences would not be confined to the few under military environment, but would extend to and affect the civil status of the whole profession.

We sympathize with the few dentists who have entered the hospital corps, or in some other irregular way have acquired the opportunity of rendering dental service to a very limited proportion of the army, and who believe such sacrifice necessary as an entering wedge—as one now in such service in the Philippines expressed it—to a general provision for army dental surgeons; yet we can imagine nothing more detrimental to the attainment of the object sought.

We hold that it is the duty of the Government, for humanitarian and economic reasons, to provide the army and navy with a corps of dental surgeons comparable in professional education and efficiency to the corps of surgeons. We believe we are confirmed in this by the past and present position of the profession. The first and most natural would be a legislative or a departmental requirement that a certain proportion of those entering the service as army surgeons should, in addition to the qualification now required, be qualified to perform the function of a dental and oral surgeon. The number should be sufficient to meet the needs of the service, and assigned under prevailing customs. Such a provision need not in any way disturb the ordinary operations of the medical corps nor affect the *esprit de corps* of its members. The alternative method contemplates the organization of a distinct branch of the medical corps under the supervision of the Surgeon-General, but otherwise its control and direction to be under its own officers, and, in respect to rank and the right to promotion through the grades below that of Surgeon-General, to be under the same rules and conditions as are applicable to army surgeons.

In our opinion there is no other way by which the operation of such a corps could be made effective, efficient, and satisfactory; no other way of obtaining competent service and maintaining professional relations. In regard to other aspects of the subject, we as a profession have no responsibility, and we recommend that, in the event of proposed legislation relating to the subject, this association should limit its efforts to an attempt to secure a proper status for the army and navy dental surgeon and his placement under conditions favorable to his highest degree of efficiency.

We may as good citizens, humanely disposed to our country's defenders, and knowing their need in the premise better than it is possible for others to know, use with propriety our information and influence with members of the Senate and House, of the army and navy, and of the War and Navy Departments, that on them may rest the responsibility of the suffering, loss of time, and acquirement of permanent diseases and disabilities through failure to provide timely service.

There has been no naval legislation recently with which this subject could be conveniently connected. The conditions in the navy are so entirely different from those pertaining to the army, and present so many more obstacles to the inclusion of dental surgeons in its service, that the Surgeon-General has not yet, though we believe quite willing, been able to find an expedient plan by which the need of the navy in this regard may be met.

As a matter of history, it may be added to this report that the Military Affairs Committee of the House of Representatives offered to the House an amendment to H. R. No. 11,022, known as the Hull Army Reorganization Bill, providing, as an addition to the medical corps, for "a hundred dentists, with rank, pay, and allowances of a first lieutenant, mounted, who shall be graduates of a dental college, and shall pass a satisfactory professional examination." The "rank" proposed corresponds to the lowest grade of assistant surgeons, and the pay and allowances amount to $1600.

The Hull bill as recommended to the House provided for five hundred medical officers on a basis of one hundred thousand men for the whole army, and the committee amendment for one hundred dentists was made on the same basis. When this part of the bill came up for action on January 30, 1899, a peculiar political condition confronted the House, which made it necessary for the Military Affairs Committee to ask the House to amend every section of its own bill.

The committee reduced the number of medical officers asked for from five hundred to two hundred and thirty-five, and would probably have reduced the number of dentists to about sixty and given them the right of promotion, unintentionally omitted in the original amendment, and provided a more satisfactory grading, but the zeal of Representative Cox, of Tennessee, led the minority in securing the total rejection of the amendment. We know personally members who acted with the minority against almost every feature of the bill who would have gladly supported the amendment if they could have done so independently of party obligations.

The Surgeon-General of the army was not an advocate of the provision for dentists. When questioned by the Military Committee he spoke of it as an innovation, as contrary to established policy, but admitted that, in his opinion, dentists are needed, as are hospital stewards, pharmacists, and others of the hospital corps.

After the amendment was made providing for dentists of the grade of first lieutenant he assented to the suggestion of this committee that they should have the right of promotion, but was not impressed as fully as we would like with the suggestion that their efficiency would be greatly enhanced by providing grades for the more effective direction of the operations of the corps and as an inducement for a more competent class to offer their services.

Without the urgent advocacy of the Surgeon-General or the wisely-directed efforts of its advocates in Congress, it is only by chance that such a measure may be incorporated in the army legislation of the near future, but it will some day be adopted as a measure of humane interest in the soldier's comfort and welfare, of business economy in preventing the loss of his service in times of its special need, and in preventing the cost of his maintenance when occasionally unfit for duty and when permanently disabled by such pensionable diseases as chronic indigestion and chronic diarrhea, which so often have their beginning in easily prevented diseases and disorders of the mouth and teeth.

Respectfully submitted,
M. F. Finley,
C. S. Butler,
Wms. Donnally,
Committee.

The Committee on the History of Dentistry presented its report,* which was read by Dr. Charles McManus, chairman. The report was accepted and the committee was continued, the president being authorized to fill vacancies.

The Committee on Amendments to the Constitution made its report, which was ordered to be printed and to lie over for consideration with the report on the president's address.

On motion of Dr. J. D. Patterson, of Kansas City, the vote of censure passed on the New Jersey State Dental Society last year was rescinded.

On motion of Dr. C. W. Stainton, of Buffalo, a committee of three was appointed to examine the books of the Dental Protective Association. Drs. Stainton, H. A. Smith, and J. Y. Crawford were appointed. The committee subsequently reported that they had found the affairs of the association properly conducted.

Adjourned to 7.30 p.m.

(To be continued.)

At the Friday morning session Old Point Comfort, Va., was selected as the place for the next meeting, and the following were elected officers: B. Holly Smith, Baltimore, president; John I. Hart, New York city, Truman W. Brophy, Chicago, and M. F.

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*This report will appear in a later issue of the Dental Cosmos.

Finley, vice-presidents; Emma Eames Chase, St. Louis, corresponding secretary; Geo. H. Cushing, Burbank, Cal., recording secretary; Henry W. Morgan, Nashville, treasurer; H. A. Smith, Cincinnati, T. S. Waters, Baltimore, and J. D. Patterson, Kansas City, members of the Executive Committee; H. J. Burkhart, Batavia, N. Y., Thomas Fillebrown, Boston, J. Y. Crawford, Nashville, J. S. Cassidy, Covington, Ky., and W. E. Griswold, Denver, executive council.

The newly-elected president was installed at the afternoon session, and reported the appointment of Drs. A. W. Harlan and C. N. Johnson to the Publication Committee.

UNION MEETING OF THE DISTRICT OF COLUMBIA DENTAL SOCIETY, MARYLAND STATE DENTAL ASSOCIATION, AND VIRGINIA STATE DENTAL ASSOCIATION.

THE third annual meeting of the above-named societies was held in Washington, June 7, 8, and 9, 1899.

FIRST DAY—*Morning Session.*

The meeting was called to order at 10 o'clock by Dr. John H. London, chairman of the Committee of Arrangements, and the session was opened by prayer by the Rev. Geo. F. Dudley, of Washington.

Dr. CHAS. A. APPLER, president of the District of Columbia Dental Society, took the chair and read an address of welcome, to which responses were made by Dr. M. G. SYKES on behalf of the Maryland State Dental Association, and Dr. CHAS. L. STEEL on behalf of the Virginia State Dental Association.

WM. A. MILLS, D.D.S., of Baltimore, read the following paper:

ARSENIC AS A DENTAL PULP DEVITALIZER.

Much has been said lately for and against arsenic as an agent in the devitalization of dental pulps. Many practitioners contend that the use of such a painful and dangerous drug, in view of to-day's surgical procedure and scientific knowledge, is only a little short of empiricism. Others claim that it is a successful conservative method, and although it has been abused in some cases through carelessness and ignorance, yet an intelligent application of it is legitimate and scientific practice, and is less painful and dangerous to dental tissues and the general health of the patient than some of the means suggested as substitutes.

We fully agree with the latter, as we have found arsenic "a true and tried friend" under many puzzling circumstances, and in no case have we ever had cause to regret having used it. We have never used any of the many formulæ published at intervals in textbooks and journals, and therefore cannot speak knowingly of their merits or demerits, except, judging from the reports of patients who have had "nerves killed," their painless action in many cases must have been total failures.

From this oft-repeated story there must be sufficient ground for their complaints, and from our long experience with arsenic we can only infer that something was radically wrong in their application, combination, or both. Dental pathologists claim that when arsenic is used to devitalize dental pulps it acts through its escharotic effect as a powerful irritant, making the capillary vessels of the dental pulp to dilate and afterward become engorged with blood, producing at the apex of the root of the tooth a thrombus or plug, causing death of the dental pulp by continued paralysis. If this is true, patients so treated must suffer untold agonies, and are justified in saying all manner of evil things against it, while its opponents cry out, "Away with it!"

Notwithstanding what is said in opposition, there is a better side to the question, for arsenic, like fire, makes a good servant but a bad master. This *stereotyped* procedure of death of the dental pulp by pain, congestion, and strangulation can be changed in nearly all cases by adding to arsenic modifying drugs to control its irritating action, and, taking advantage of its *toxic* power, we may accomplish our aim without pain.

We have been using a formula compounded with this object in view, and, having tested its virtues in all manner of cases, we believe it to be a good one. In it the escharotic action of arsenic is controlled with creasote; the blood in the capillary vessels is *driven* out with alum and creasote; the dental pulp is narcotized with creasote and morphin. The escharotic action of the arsenic being reduced, it is slowly absorbed while the dental pulp is in a state of anesthesia, and an unconscious death follows by poisoning, and not by irritation and congestion.

In using this combination we have experienced a little difficulty in producing perfectly painless devitalization in rare cases, owing to individual idiosyncrasies and the resistance met with in highly organized teeth. In no case, however, was the pain so acute that the patient objected to having the same treatment given some other tooth when found necessary.

In devitalization of dental pulps it is important that we know just how much arsenic and how long we should apply it in each case to enable us to confine its influence only to the body of the dental pulp, while the tissues lying at and near the apical foramen are not disturbed in their physiologic functions.

To gain this knowledge requires care and practical experience, and when the problem is solved we are masters of the situation. It has been asked, "Has any one found the exact limit of the destructive power of this agent?" We answer theoretically "No" if its irritative action is referred to, and "Yes" if its toxic effect is meant.

So-called arsenious acid is not an acid as its name implies, but is an oxid, and only becomes an acid when coming in contact with water. It is through this affinity that when it is applied to vitalized tissues it is absorbed by them, the limitation of absorption being reached when the last molecule of arsenious oxid is satiated.

After the arsenic has penetrated the tissues and has been changed into *arsenious* acid, this again combines with the hemoglobin of the blood to form arsen-hemoglobin, and through its toxic power causes structural degeneration of the cellular elements, followed by the death of the tissues as far as the arsenious acid had penetrated and formed arsen-hemoglobin. (Arkövy.)

From this we can readily understand that when too much arsenic is applied it does not confine its action alone to the dental pulp, but penetrates the tissues beyond the apical space. To this cause many of our failures may be attributed. The fact that the toxic effect of arsenic can be intelligently controlled when locally applied to highly vitalized tissues has been demonstrated again and again by so-called "cancer doctors."*

When arsenic is applied to the leaves or roots of living plants it causes them to rot if the supply of water in the tissues is large, and shrivels or dries them up if the supply is slack.† This action may account for some of our mummified cases. The following is our formula and manner of applying it:

℞—Acidi arseniosi pulveris, ℈j;
Morphinæ acetatis, gr. v;
Aluminis pulveris,‡ gr. x;
Creasoti B. W., gtt. x.
M.—Fiat massa.

After cleaning out the cavity as well as possible without causing pain,—do not expose dental pulp if not already exposed by decay,—take as much of the mass as will equal the size of a common pin-head; lay this on a small pad of cotton previously dipped in creasote; place this in the seat of decay with the arsenic at the nearest point to the dental pulp and press it gently to position; then pack the cavity not quite full with loose cotton, being careful to so place it that pressure is not made upon the nerve.

On this place a piece of paraffin, seal it with a hot instrument, and dismiss patient for twelve or twenty-four hours. To remove dental pulp clean out the cavity, test for vitality with a stream of cold water from a syringe; if no thermal response is given make free access to the pulp-chamber and pass a broach well up the root-canal.

If the action of the arsenic has been confined to the body of the dental pulp the patient will experience a slight pain as it approaches the apex;§ then withdraw broach until pain ceases; give it one or two turns to snare the dental pulp; tell the patient to make a rapid inspiration through the mouth, and with a quick action remove it.

If the dental pulp responds to the cold water test seal the cavity and dismiss the patient for twelve hours, or more if found necessary. In no case ever make a second application of arsenic, for when once applied it will accomplish its deadly work if sufficient time is given.

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*Arsenic is again being used by many reputable general practitioners for the removal of malignant tumors; all of their reports being favorable. In dental practice, see *Pacific Medico-Dental Gazette*, March, 1899, page 201.

†Stillé and Maisch's Dispensatory.

‡Reduce to an impalpable powder before compounding.

§This condition has been attributed to arsenical poisoning, but we claim just the reverse.

Never hesitate to make an application to an inflamed dental pulp, as we have found that, instead of increasing the pain, it will soothe and quiet it immediately in nine out of ten cases. Before making it moisten cavity with warm water.

If through the carelessness of patient or other cause, when the patient returns to the office the tooth is found sore to touch, or the peridental membrane is inflamed, paint the neck of the tooth with liquid dialyzed iron;* pack the root-canal with cotton dipped in the same solution, seal cavity, and dismiss patient for twenty-four hours.

Discussion.

Dr. H. C. Thompson, Washington, said that the paper dealt with a subject that had long been a puzzle to dentists. How to apply arsenic to a pulp which is already in an inflamed state without increasing the inflammation and consequent pain was a question often arising in dental practice. What we want is to get the toxic effect of the drug without its irritating action.

Dr. Mills speaks of applying it with other drugs so as to get an obtunding effect, but we know that there is ordinarily an engorgement of the parts, an increased hyperemia and an increase of pain, followed by death of the pulp. His practice was to use antiphlogistic treatment to reduce the congestion, and then not put the arsenic in contact with the pulp. The arsenic should not be left in the tooth more than twenty-four hours; much less time will not do. In many cases it is advisable to put the arsenic in a part of the tooth remote from the pulp; then it may be allowed to remain forty-eight hours or longer, and the death of the pulp will be attained without pain. If only a minute quantity of arsenic is used,—and exceedingly little will be found sufficient,—no fear of discoloration of the tooth need exist.

Dr. C. J. Grieves, Baltimore, said he agreed with Dr. Thompson in recommending the application of arsenic at a point remote from the pulp. He would ask Dr. Mills why he used alum in connection with arsenic.

Dr. H. M. Schooley, Washington, thought that often the real cause of pain following the application of arsenic to a pulp was the pressure of the application. He uses the least possible amount of arsenic, and in recent cases had washed out the cavity with a ten per cent. solution of cocain. He then takes a slow-setting cement and builds up around the point where the pulp is exposed till he has it surrounded with a wall of cement with a little hole in the top. He then makes a new mix of the cement and while it is soft flows it over the top, and this has a closure over the pulp without possibility of pressure upon it.

Dr. David Genese, Baltimore, did not understand why Dr. Mills should mix so many materials with the arsenic, and thought it was a mistake. He did not think it right to make the application while the pulp was inflamed, and never destroyed pulps unless they were exposed. If all pressure on the pulp is carefully guarded against the arsenic may safely be left in the tooth for several days if necessary.

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*This combines with the arsenic and forms arsenite of iron, when its toxic effect ceases.

Dr. M. F. Finley, Washington, rarely destroys pulps unless they are exposed; thought it better practice to try to preserve them. He agreed with Dr. Genese that it was better to try to soothe the pulp before applying arsenic, and used cotton to seal up the cavity and prevent pressure.

Dr. Wms. Donnally, Washington, said it often occurred that the toxic effect of arsenic is shown in the peridental membrane; not immediately, but after the lapse of years, making trouble which is very difficult to remedy. He had often to regret the use of arsenic in his own cases and in those of other practitioners. He thought that applying arsenic in conjunction with other penetrating oils or creasote favored the penetration of the tissues by the arsenic, and so increased the liability of these after-troubles. Pressure he did not object to so much, as it hastened the action of the arsenic and so lessened the danger of its penetration to surrounding tissues.

Dr. B. Holly Smith, Baltimore, was very cautious in the use of arsenic and rarely used it, as he had so often found alveolar conditions followed its use, which would redound to the discredit of the profession, or at least to those who applied the arsenic.

Dr. Mills said that he never used arsenic except when the pulp was exposed, and when it was impossible to save it. The alum was used for its astringent effect; it helps to relieve the inflammation, and does not cause pain. The use of arsenic as applied to inflamed pulps is made safe by adding water to the arsenic. This changes arsenious oxid to arsenious acid, which does not produce irritation, but kills the pulp by slow poison. To kill a pulp by surgical procedure he thought too severe to be good practice. The arsenic should not be left on the pulp until the whole pulp can be removed painlessly. This would be a sign that arsenious gangrene has been produced, and this is what damns the use of arsenic in the dental profession. The pulp should be removed while it is still alive, and blood should follow. Arsenic is a drug which should be watched very carefully when used in the teeth.

The subject was passed, and adjournment was had till afternoon.

Afternoon Session.

The convention was called to order at 3 P.M.

Dr. David Genese, Baltimore, exhibited a number of casts and photographs showing deformities of faces from injuries, with appliances for correction and result of treatment. One case was the loss of the ear, with restoration of an ear made of rubber; another the restoration of a nose destroyed by lupus, the false nose being made of rubber mixed with powdered glass and coloring matter before the rubber was vulcanized. The nose is held in place by a gold bulb fitting the opening; this will cause less irritation than clasps or springs, and holds the nose securely in place. In case of fracture of the jaw, his method is to make an internal splint, so as to hold the teeth in position, and then make an external splint by first binding the jaw up with linen bandages as tight as possible, covering the chin and jaws well back to the ramus, and on each side plaster is then applied, bringing it well up on the ramus. A splint applied in this manner will not be likely to cause irritation, and can be left in place until the union of the broken bones is complete. Many cases were shown illustrating different operations, but without the models in hand it would be impossible to follow the description as given.

Dr. J. H. P. BENSON, Washington, read the following paper:

MATERNAL AND CONSTITUTIONAL INFLUENCES IN THE DEVELOPMENT AND DISEASES OF THE TEETH.

The progress made in dentistry in recent years and the high degree of perfection reached in all pertaining to operative procedure has been most gratifying to all interested in the subject. But, with all the enlightenment we have, it is nevertheless true that there is a continued and steady deterioration in the quality of the teeth presented in a large percentage of the cases which daily come under our observation.

Many of the pathological conditions requiring our professional attention are traceable to an inherent weakness in the teeth, the original defects in construction, together with their small degree of recuperative power, leaving them an easy prey to all forms of dental disease.

We undoubtedly save more teeth at the present time than they did a few years past, but that the preventive measures we have at our command are wofully inadequate is self-evident, for I am sure that it is the experience of the majority of us in our clinical examinations that there is no noticeable improvement either in the strength or development of the teeth, and this especially so in regard to those of children.

The people of the present day are certainly better informed in regard to the importance of possessing sound teeth, and in consequence pay more attention to their care and preservation, than did their forefathers; but the fact remains that the teeth of the present generation are much inferior in strength and development to those of our ancestors.

We cannot account for this on the theory of neglect, for it is not the local aspect of disease we are considering, but structural imperfections in the development of the teeth. We well know that a normally developed tooth will better withstand attacks of disease and rough usage than one imperfect in growth or structure. In this way alone can we account for the fine teeth many possessed years before dentistry was elevated to the dignity of professional honors, and the greater number of the people beyond the reach of the few practitioners who then existed.

The people of those times were superior to us also in size and general physical development, and this was especially so in regard to the osseous system, the bones being massive and dense in structure; markedly so in those of the face and skull. With robust and hardy constitutions and fine osseous structures we can readily understand their ability to beget offspring with strong and perfect teeth.

In the consideration of this subject we find so many causes tending to produce dental disease that we are rather startled by the numerous factors which necessarily present themselves upon our attempting a solution of the problem.

It is necessary to go beyond the mere local condition of disease itself to arrive at conclusions accounting for cause and effect, for we must be familiar with conditions which are characteristic of health in order to recognize changes which indicate disease; and even an intelligent understanding of these facts will not suffice, for a proper comprehension of the subject in all its various phases necessitates a knowledge of the component parts entering into these organs, and also the pathological conditions and constitutional influences which tend to pervert nutrition and the perfect construction of the teeth.

The development of a tooth directs our attention back to the very starting-point of individual life, the protoplasmic body, which under normal surroundings and healthful sustenance will have all the potency necessary for the formation and birth of a living being.

As it develops in size characteristic changes in atomic arrangement take place, and those particles maturing into similar relationship become grouped together for the formation of the various tissues and organs of the body.

The group which has for its special object the development and construction of the teeth appropriates the elements necessary for this purpose and carries on to perfection the designs of nature, unless some abnormal influence interferes whereby nutrition is diverted and perfect construction prevented.

It requires but a slight reflection for us to realize how readily the future condition of the child's teeth may be jeopardized by any circumstance affecting the health of the mother at this period.

Anemia, pernicious effects of disease, faulty nutrition, environment, and the physical forces to which the human body is exposed, may be considered as conditions tending to interrupt the perfect fulfillment of the maternal function. Weakness or anemia, from whatever cause it may arise, involves a train of symptoms which suggest not disease alone, but also waste and tissue starvation, the vital forces being at so low an ebb that they scarcely more than supply sufficient pabulum for the reconstructive measures of the human economy.

The power of assimilation in these cases is greatly lessened; there may be food enough partaken of, and possibly digested, but that it is not properly assimilated is evident from the general deteriorated condition of body. Now, in this condition it is certainly reasonable for us to suppose that some of the functions of the body must be imperfectly or feebly working, and the tissues depending upon them for support and nutrition must consequently suffer from an insufficient supply of structural material.

Add to the already overburdened vital forces the increased duties involved during pregnancy, with all its attending strain upon the nervous system and the vast amount of pabulum necessary for the sustenance of the fetus, and surely we need not wonder at the deterioration of the mother's teeth or the imperfections of those of her child. Pregnancy, however, is not a disease; it is a normal function of the body of the female upon which the propagation of human as well as animal life is dependent, and should, when associated with healthful influences, be naturally performed, and the offspring should also be of a normal type.

But when the mother is constitutionally weak, possibly afflicted with some organic disease, it is more than likely there will be some derangement in the action of this function and also in the healthful development of her child. Aside from any actual disease the mother may transmit to her offspring, it may also inherit from her a poor constitution, which, though not a malady in itself, has all the accompaniments which predispose the child to disease and leaves him in such condition that the vital forces are inferior and insufficient to meet the demands that may arise from any pathological alterations in the tissues of the body, the waste going on at such a pace that it is impossible for the anemic condition of the patient to sustain.

Should the mother, however, be healthy and strong, and anatomically normal in relation to child-bearing, we have every reason to assume that her offspring will also be healthy and well developed. This being so, we necessarily expect to find the dental organs strong and well constructed, for if the mother thus produces a healthy child, capable of performing all of the functions of the body in a normal way, and dentition being one of those functions, it also should be normal in its performance.

There are, of course, deviations from this reasoning in its practical application to our every-day experience, for children come under our care with teeth wofully defective who otherwise seem perfectly healthy and whose parents are robust and strong. In such cases there must be some functional derangement in those organs upon which the teeth are dependent for nutrition and development; there is evidently a lack of nutritive supply or a determined refusal of the organs involved to properly assimilate the pabulum which the normal vital forces are supplying.

We presuppose that the system in a state of health elaborates sufficient of the elementary principles to supply the necessary kind and amount to all the tissues of the body, and when we find conditions at variance with this supposition they are possibly attributable to some aberration in the laws of nature or shock received while the affected organs were in an early state of formation.

Because we find children in perfect health with poor teeth is no argument, however, against the position held by the best authorities, that the all-important point in the development of the teeth is vigorous health and strength in parents and child alike.

Hereditary influences are potent factors for good or evil in the future prospects of the offspring,—morally and physically. Constitutional defects and diseases are thus transmitted, and we can plainly see their influence in such cases upon the teeth. Irregularities, peculiar shapes, and almost all abnormal conditions of a like nature are readily transmitted, and the same is true in regard to organization. Indirectly by transmitting constitutional diseases, especially syphilis, the effects upon the teeth may be quite marked.

Maternal influence, however, is the all-important and fundamental principle involved in the development of the child and its teeth. The father's health and influence, while important, is nevertheless second to that of the mother as a factor in the physical development of the child, for many physical defects which the offspring might inherit from him may, if the mother is healthy and strong, be greatly modified or entirely eradicated. But if we reverse this and have all the health and vigor upon the side of the father, with the mother sickly and weak, the chances are that the child will manifest in development the constitutional infirmities of the mother rather than the good health of the father.

There is more than the mere theory of reasoning to warrant such statements as these, and facts and theory alike go hand and hand to vouch for their truthfulness. For if we go beyond the peculiar manifestations themselves and consider the conditions existing during intra-uterine life, we still find that the laws governing the human body at this period are ample to explain cause and effect. It is within the womb of the mother that the child receives all the stimulus and sustenance for life and development. Here, in the laboratory of nature, are generated all the essential elements necessary for the completion of God's design in the creation of the fairest of His creatures.

In the elaboration of this work the child imbibes from the very elements of the body of the mother the pabulum necessary for the construction of all the tissues and organs of the body, the complicated mechanism being herein assembled and endowed with life and motion.

The circulation of the blood, the action of the heart, every particle of sustenance, and, in fact, every function of the fetus depends upon the mother for its existence and proper performance.

Influences affecting her affect the child; constitutional disturbances in her health become factors for the promotion of disease or structural defects in the formation of the infant.

A lack of nutritious food is marked in its effect upon the health of both mother and child; in fact, the sympathy existing during intra-uterine life is so great, and the susceptibility of the fetus so acute, that there is hardly any pronounced disturbance that might occur, either to the mind or body of the mother, but may have a decided influence upon the child.

There are numerous facts recorded which prove that habitual, long-continued mental disturbances of the mother at an early period of pregnancy induce deformity or other abnormal development of the infant.

It is interesting to note how in all times and all countries women when in this condition have been treated with great kindness and consideration. At Athens and at Carthage the murderer escaped from the sword of justice if he sought refuge in the house of a pregnant woman. The Jews allowed her to eat forbidden meats. The laws of Moses pronounced the penalty of death against all those who by bad treatment or any act of violence caused a woman to abort. In ancient Rome, where all citizens were obliged to rise and stand during the passage of a magistrate, wives were excused from rendering this mark of respect, for the reason that the exertion and hurry of movement might be injurious to them in the state in which they were supposed to be.

This not only demonstrates the respect and consideration which has ever been paid to women in this condition, but also the fact that church and state alike recognized the importance of preserving and guarding the health and person of the prospective mother, thereby not only considering the respect and caution due her in her delicate condition, but taking into account also the welfare of the child.

These circumstances all prove to us the importance of sustaining the health of the mother and exempting her as much as possible from all physical disturbance which might in any way affect the child.

In the breeding of fine stock the first consideration is the proper selection of the dam and sire, and the choice in these cases is always made of those animals whose pedigree shows the purest blood and breeding and the special traits which it is desired the offspring shall possess.

But, even if the animals thus selected be of the purest strain, if either is unhealthy or weak the judicious breeder will first see that these faults are corrected before he breeds from them, for he knows from experience that it is impossible to produce a strong and healthy offspring if the dam or sire is in an unhealthy condition.

And I believe that it is the consensus of opinion in these cases that the breed and health of the dam has more to do with the type of offspring produced than has that of the sire, especially in regard to its future health and strength.

This is a principle which predominates largely in all animal life, and man yields much in his general make-up to this law, and hence constitutes no exception to the inference we would draw from its consideration.

The importance of health and perfect physical development in its relation to child-bearing and the normal construction of the teeth is so evident from whatever side we view the facts connected with the subject, that the most casual observer must surely be impressed with the truth and soundness of the theory.

While there is a general tendency toward improvement in the physical condition of the women of our country, still to the close observer it is but too apparent that the change for the better in this regard is but slight, although hopes may be high for more gratifying results when there comes a better understanding and more appreciative acceptance of the theories and advice of science and medicine.

That the average woman of our large cities is below the normal in almost all that tends to produce healthy and robust offspring is a fact that few, I am sure, will dispute.

The better class of city girl, nurtured in luxury and comfort, devoid of environment or need which would contribute its quota of healthful exercise and fresh air, deteriorates in health and strength as she matures, and she hardly more than ripens into the beauties of full womanhood than she fades in health and strength, which in many cases gradually develops into some constitutional weakness.

Complications arising at the menstrual periods also add to the failure of her health, and when she marries, in the majority of cases, her physical infirmities increase instead of improving, for the already weakened constitution is then taxed by the performance of a new function that has hitherto been dormant, and that she is unable to naturally perform this function, or bestow upon her offspring healthy physical development and perfectly constructed dental organs, the medical and dental professions can amply attest.

These conditions do not exist among the lower orders of the human family; the Indian and negro, for instance, have, as a rule, splendid physical development and fine teeth. The women when pregnant go on in their ordinary routine of life, performing in many cases work requiring a great amount of labor; and think nothing unusual of their condition, but work right along, almost up to the very moment of their confinement; and when the child is born it is without all the accessories necessarily attending the birth of an infant in the higher walks of life, and the mother is soon up and about again, giving little care or attention to either herself or babe more than that which nature and maternal instinct would suggest. We have but to study their habits and mode of living in order to account for their hardy and robust constitutions. Physical labor, rugged life in the open air, and coarse food are some of the causes tending to produce these effects, and they seem confirmed by the fact that as soon as these people are brought under the sway of modern civilization and adopt our mode of living they degenerate in health and physical development; their teeth also deteriorating. This is well illustrated in the case of the negro and Indian in this country.

The peasantry of Europe are also physically the superior of our own people of the same class, and they also possess better teeth. Here you will find like conditions existing as in uncivilized life, only in a more modified form. They live upon coarse fare and spend much of their time laboring in the open air, the women as well as the men in many countries working in the fields from sunrise to sunset; and while we deprecate the circumstances that have so cast the lot of these poor women amid trial and deprivations, still we are gratified in knowing that nature makes them some return for the efforts of their labor aside from the mere yield of the harvest they may reap; for to the very air they breathe in the continued outdoor employment and the physical labor attending it they owe much of their robust health and hardy constitutions.

The conclusions we would draw from the consideration of the subject as herein presented would be that food, fresh air, and healthful exercise are the important factors tending to produce in the women of our country that high standard of health and physical condition which would assure to them a robust and hearty constitution, and to their offspring an inheritance equally rich in the blessings of health.

There are other factors which might be considered as necessary in contributing to produce an improved condition of the teeth of both mother and child, such as special dieting, phosphate feeding, etc., but they all become secondary in importance to the necessity of good, sound health in the mother; for if she is robust and strong there will be no need of special feeding ordinarily, for, her digestion being normal, she will be able to derive the nutrition necessary for all the wants of nature from a plain, wholesome diet, and give to her infant from her own breast the food and nourishment God intended it should receive.

Discussion.

Dr. W. A. Mills, Baltimore, said he had listened to the reading of Dr. Benson's paper with pleasure and profit. To strike at the root of all dental lesions, especially the decay of the teeth, and to annihilate them would be the most beneficial and wonderful event of the nineteenth century. The fact cannot be denied that the diseases and the losses of the dental organs are to-day making "countless millions mourn," notwithstanding all the advances made in stomatology to preserve them. While it is true that degeneracy may play no small *rôle* in the causation of these diseases, yet in his opinion it does not play the important part the advocates of this theory would have us believe. Much light of late has been shed upon this subject, and now we see plainly that much that was formerly considered true exists only in theory. The first cause of much of the dental trouble may be laid at the door of malnutrition of the mother during gestation. If a tree in its fruiting season has not, or cannot assimilate, proper and sufficient food to generate normally it cannot bring forth perfect fruit. If this be true of vegetable life, how much more important is it, in order that the fruit of the woman be perfect, that she should be supplied with the right kind of nourishment and her physical system be kept in a condition to elaborate this supply and place it where it belongs. The mothers of our patients, more especially in the higher walks of life, fall under the curse of impoverished food and false assimilation during the period of child-bearing. They do not get the food that is needed, or their systems do not get the benefit they should from it. Failing these, their offspring are brought into life without the strength of constitution and perfection of nutrition power which would develop dental organs able to resist the ravages of disease and decay.

Food for the mother should be rich in phosphorus, magnesia, potash, soda, sulfur, and lime. Without these elements in sufficient quantity the child is born enfeebled in brain, nerve, and bone tissues, and particularly the tissues forming the teeth. While all other deficiencies may be improved or remedied after birth by the administration of proper nutriment, and perhaps some of the preparations of phosphates or hypophosphates, no improvement can be made or defects overcome in the teeth by any means known to us. As the crowns of the teeth are formed before the child becomes a breathing being, if lacking in mineral salts so they remain until lost by the ravages of decay, painful companions to their possessor and a worry to the conscientious dentist in his vain efforts to save them even for a few years of usefulness.

Nature has fully provided for the normal propagation of the human species, but if her laws are violated, either through ignorance or otherwise, she is quick to resent such interferences, yet at the same time she is ever ready to furnish a panacea if we obey her teachings and interpret her aright.

Probably the chief cause of the dental decay of our time is the almost universal use of white flour, which through the improved (?) milling process of the present day is deprived of all the mineral salts, and contains, instead of the whole wheat, man's staff of life, only pulverized starch. This has been proven to be true by the scientific experts of the Agricultural Department at Washington. Baron Von Liebig sounded the alarm years ago when he said, "Serious, very serious injury to the human race would be sure to follow the constant eating of impoverished white flour, where the phosphates, so essential to man's health, had been milled out." Dalton says, "In fetal life a meager supply of the phosphates makes the bones of a child to bend and his skeleton deformed."

In conclusion, he did not agree with Dr. Benson when he says that "the people of former times were superior to us in size and general physical development, especially so in relation to their osseous system," for the verdict has been long since rendered by those making this subject their study and has been accepted as true that the men of to-day not degenerates are far superior in all respects to their forefathers.

Dr. B. HOLLY SMITH, Baltimore, said that as professional men we are, or should be, teachers, and he congratulated Dr. Benson on the excellent teaching contained in his paper.

Herbert Spencer said, "If a man would acknowledge ignorance in the breeding of dogs or horses he would not be considered fit to have charge of a stud farm or a kennel," but how many of us pretend to understand or concern ourselves about the principles which should govern the breeding of human creatures. Considering the responsibilities involved, is it not amazing that we do not make the subject a serious study? How little is known of the problems of pre-natal influences, and how rarely is any care taken that the parents who are about to become responsible for a future human being know or think it necessary to know whether they are in the best condition to perform that function with the best result. On the contrary, many, indeed a large proportion, of us are the result of accident, and are brought into the world unwillingly. Now, may not this very lack of intention exert an influence upon the nutrition of the child?

The ancients were more wise than are we in this regard. It was a matter of reproach for a woman not to bear children to her husband. In this age it is a subject of reproach and a matter to be concealed as much as possible when a woman is in this condition. He thought that we should be wiser than we are in this regard, and should look with pride on those who bring into the world a large family.

He thought much could be done during the life of the fetus for the improvement of the denture, and believed that it was not only advisable to see that the mother was sufficiently and properly nourished, but that she was shielded from anything that would tend to depress her spirits or excite such passions as fear, envy, anger, or jealousy. These passions are known to arrest and disturb the vital functions under ordinary conditions, but under the condition of a pregnant woman they threaten not only the present comfort of the woman, but the lifelong well-being of the child, and often its very life.

Dr. R. Ottolengui, New York, did not agree with Dr. Smith's pessimistic views, but was convinced that many children are conceived very scientifically and carefully planned for. He instanced the case of an intimate friend of his whose family showed the results of this care. In conclusion, he did not think the human race was deteriorating; he believed the doctrine of the survival of the fittest was exerting its influence, and that we are improving in all of our attributes as civilization advances.

Dr. Mills agreed with Dr. Ottolengui that the offspring of pure affection is born under favorable conditions so far, but so few women are willing to bear children, and when born so few are willing to permit the child to nurse, that the infant is deprived of the nutrition which no artificial food will adequately replace.

One thing that dentists must keep in mind, however, is the fact that they cannot judge the world by their patients. Those who come to us have bad teeth; those who have good teeth do not come to us. He thinks the working class, who do not eat so much rich food, and who have to work harder with their teeth to get the food they use masticated, have better teeth because of the additional and necessary exercise they give them.

Dr. Benson, closing the discussion, thanked those present for the attention his paper had received and for the discussion it had called out. His opinion was that our ancestors had had better teeth and better physical structure generally than we have now, though in this he might be mistaken.

As to the period of gestation, the mother should be defended from all anxiety and violent emotions in the interest of the child, and should be nourished by the use of such foods as are calculated to supply the double strain on her system. The happiness of the mother is very important, and her food not less so, as the perfect health of the mother gives the best possible promise of the proper development of the child.

(To be continued.)

TENNESSEE DENTAL ASSOCIATION.

The thirty-second annual meeting of the Tennessee Dental Association was held in Chattanooga, July 4, 1899.

The papers that were read showed much thoughtful study, and each did credit to its writer. The discussions, though sometimes foreign to the subject, were in the main good.

In addition to the usual routine of dental subjects discussed, one that was specially dwelt upon was the arousing of our profession as a whole to a sense of duty and responsibility in regard to educating the masses on dental lines and the means to bring about this result. Another was the raising the standard of our profession and raising means to stimulate the more thorough scientific investigation of subjects not yet settled and new ones that may arise.

The association adjourned at 4 o'clock, July 6, after selecting Memphis as the place for the next meeting. The following were elected officers for the ensuing year: A. R. Melendy, Knoxville, president; J. M. Glenn, Trenton, first vice-president; Joe T. Meadors, Columbia, second vice-president; A. Sidney Page, Columbia, recording secretary; N. C. Leonard, McMinville, corresponding secretary; H. E. Beach, Clarksville, treasurer.

A. SIDNEY PAGE, *Secretary.*

WISCONSIN STATE DENTAL SOCIETY.

FOLLOWING are the officers of the Wisconsin State Dental Society for the ensuing year: J. H. Reed, Lancaster, president; T. M. Welch, Waupun, first vice-president; R. J. Wenker, Watertown, second vice-president; W. H. Mueller, Madison, secretary; H. A. Palmer, Janesville, treasurer. The next meeting will be held in La Crosse, on the third Tuesday in July, 1900.

W. H. MUELLER, *Sec'y.*

NEW JERSEY STATE DENTAL SOCIETY.

AT the annual meeting of the New Jersey State Dental Society, at Asbury Park, July 19-21, 1899, the following officers were elected for the ensuing year: Wm. E. Truex, Freehold, president; F. Edsall Riley, Newark, vice-president; Chas. A. Meeker, Newark, secretary; H. S. Sutphen, Newark, assistant secretary; Henry A. Hull, New Brunswick, treasurer. Executive Committee, Oscar Adelberg, Elizabeth; H. S. Sutphen, Wm. L. Fish, Newark; Frank L. Hindle, New Brunswick. Membership Committee, Wm. H. Pruden (chairman), Paterson; N. M. Chitterling, Bloomfield; F. G. Gregory, Newark; G. M. Holden, Hackettstown; J. L. Crater, Orange. Member State Examining Board, Chas. A. Meeker, Newark.

H. S. SUTPHEN, *Asst. Sec'y.*

CALIFORNIA STATE DENTAL ASSOCIATION.

At the annual meeting of the California State Dental Association, held in San Francisco, June 20 to 23, 1899, the following were elected officers: Walter F. Lewis, Oakland, president; A. F. Merriman, Oakland, first vice-president; A. M. Barker, San Jose, second vice-president; F. L. Platt, San Francisco, third vice-president; R. W. Meek, Oakland, recording secretary; A. C. Hart, San Francisco, corresponding secretary; Thomas N. Iglehart, San Francisco, treasurer.

The next meeting will be held in San Francisco, June 19, 1900.

R. W. Meek, *Recording Sec'y.*

MARYLAND STATE DENTAL ASSOCIATION.

Following are the officers of this association, elected July 27, 1899: E. E. Cruzen, president; G. Marshall Smith, first vice-president; J. K. Burgess, second vice-president; Richard Grady, recording secretary; George R. Carter, corresponding secretary; S. C. Pennington, treasurer. Executive Committee, B. Holly Smith, chairman; C. M. Gingrich, W. W. Dunbracco.

SOUTH CAROLINA DENTAL ASSOCIATION.

The twenty-ninth annual meeting of the South Carolina State Dental Association was held at Harris Lithia Springs, commencing Tuesday, July 11, 1899.

The following officers were elected for the ensuing year: P. B. Connor, Laurens, president; T. J. Crymes, Greenwood, first vice-president; C. B. Colson, Charleston, second vice-president; David Aiken, Winnsboro, corresponding secretary; R. Atmar Smith, Charleston, recording secretary; G. W. Dick, Sumter, treasurer.

The next annual meeting will be held at the same place as this year's meeting, commencing on the second Tuesday in July, 1900.

David Aiken, *Cor. Sec'y.*

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DENTAL COLLEGE COMMENCEMENTS.

COLLEGE OF PHYSICIANS AND SURGEONS OF SAN FRANCISCO, DENTAL DEPARTMENT.

The annual commencement exercises of this institution were held in the California Theater, San Francisco, Cal., on Wednesday evening, July 12, 1899.

Addresses were delivered by Rev. John A. B. Wilson, D.D., and Hon. John P. Irish.

The degree of D.D.S. was conferred on the following graduates by Professor J. R. Laine, M.D., president of the college:

William H. Armstrong.
Albert M. Barker.
Allen McL. Barnes.
Claude R. Basford.
Elmer H. Benjamin.
W. E. Broadwater.
William E. Brooks.
Robert C. Brower.
Edward E. Brown.
Oreian B. Burns.
Alfred Cane.
John Chalfant.
James F. Chappell.
William H. Clarke.
George L. Cool.
Albert N. Cooper.
Louis T. Cranz.
John W. Creagh.
George E. Daniels.
Carl W. Dewlaney.
Xaver Dodel, M.D.
Hudson de W. Dodge.
C. S. Duckett.
Benjamin F. Edwards.
Edward G. Eisen.
W. A. Ellis.
George C. Farmer.
Lawrence M. Finigan.
Thomas Fletcher.
William S. Fowler.
H. A. Frederick.
Chester C. Gilbert.
Carey D. Gorton.
Adolph M. H. Griesser.
Jesse W. Hamilton.
F. J. Harvey.
Otto A. Hasslinger.
Frank T. Heacock.
William R. Heacock.
John C. Hennessy.
Thomas L. Hill.
Albert O. Hooker.
Evan L. Jones.
Max V. Kempe.
Calvin W. Knowles.
Warren L. Lackey.
Delmar H. Latimer.
Walter F. Lewis.
John O. Laughlin.
Antonio M. Luz.
A. E. Macdonald.
Arthur B. Mayhew.
Albert W. McKenzie.
William F. McLaughlin.
Rodolph W. Meek.
Alvin F. Merriman, Jr.
William C. Merriman.
Albert Meyer.
Charles W. Mills.
Harry E. Minor.
George H. Ohea.
James N. Powell.
Robert H. Power.
John Robertson.
Mack J. Seeley.
Henry Sichel.
A. L. Simpson.
Charles L. Smith.
Charles F. Sloat.
Edward E. Sparhawk.
Thomas E. Strong.
Thomas X. Sullivan.
Sand J. Symmons.
Antoine W. Taylor.
Frederic Teague.
Luther A. Teague.
Clarence B. Tennyson.
George W. Thurston.
William O. Toye.
James W. Walsh.
Parker S. Wilbur.
Oliver T. Wilson.

HARVARD UNIVERSITY DENTAL SCHOOL.

The thirtieth annual commencement exercises of the Harvard University Dental School were held in Sanders Theatre, Cambridge, Mass., on Wednesday, June 28, 1899.

President Eliot conferred the degree of Doctor of Dental Medicine on the following graduates:

Percy L. Barker.
Harold N. Boyle.
Burt M. Bristol.
Ernest E. Carle.
John S. Coxeter.
James B. Crofwell.
Joseph W. Davis.
Franklin E. Dawes.
John M. Donovan.
Guy J. Elwell.
Thomas D. Esgate.
William E. Fallon.
George E. J. Federlin.
Fritz H. Finche, M.D.
George O. Gaymond.
Everett K. Hallet.
Oscar J. Heinrich.
Elbridge D. King.
Karl S. Kyes.
Arthur A. Libby.
William S. Louisson.
Thomas F. McHale.
A. C. Nathan, D.D.S.
Norman B. Nesbett.
Charles W. Patch.
James H. Pemberton.
William E. Phillips.
James E. Power.
Herbert A. Reed.
Oscar P. H. Reutersward
George D. Richmond.
Charles B. Robinson.
Williard M. Rowe.
Carl A. R. Samsioe.
Edwin S. Thompson.
Evan P. Wentworth.
Edward P. White.

BOSTON DENTAL COLLEGE.

The thirty-second annual commencement exercises of the Boston Dental College were held in Berkeley Temple, Boston, Mass., on Wednesday evening, June 21, 1899.

The annual address was delivered by Rev. J. L. Withrow, of Boston, and the valedictory by George A. Sullivan, D.D.S.

The degree of D.D.S. was conferred on the following graduates by I. J. Wetherbee, D.D.S., president of the college:

Herbert A. Besse	Massachusetts.
Benj. D. Blanchard	Massachusetts.
Henry W. Bragg	Massachusetts.
Chas. H. Buss	Massachusetts.
Robt. G. Butler	Massachusetts.
Jos. L. Carmichael	Massachusetts.
Chas. Carroll	Massachusetts.
Frank F. Carter	Massachusetts.
Wm. A. Cleary	Massachusetts.
Wm. O. Copithorn	Massachusetts.
Francis J. Costello	Massachusetts.
Georgina Crosby	Massachusetts.
E. J. Cunningham	Rhode Island.
Reginald P. Dakin	Massachusetts.
Patrick H. Devine	Massachusetts.
Wm. P. De Witt	New York.
Francis J. Dolan	Massachusetts.
Henry M. Fiske	New Hampshire.
Martin T. Ford	Massachusetts.
Edw. A. Freeman	Massachusetts.
John P. Good	Massachusetts.
Chas. H. Grantman	Massachusetts.
Chas. M. Hardon	Massachusetts.
Wm. H. Havey	Massachusetts.
A. R. Henderson	Massachusetts.
Jno. W. Higgins	Maine.
Everell James	Connecticut.
James Keltie	Massachusetts.
Clifford L. King	Massachusetts.
Chas. F. Kreppel	Massachusetts.
Jos. A. Labonte	Massachusetts.
Jos. F. Larkin	Massachusetts.
Geo. A. Lee	Massachusetts.
Harry F. Means	Massachusetts.
Daniel J. McSweeney	Massachusetts.
John R. McPeake	Massachusetts.
Jno. C. Manning	New Hampshire.
J. H. Manning	Rhode Island.
Thos. J. Morrisey	Massachusetts.
Jos. P. Murphy	Massachusetts.
John F. Pierce	Massachusetts.
Percy L. Rand	Massachusetts.
S. F. Russell	Massachusetts.
Frank A. Ryder	Massachusetts.
Jno. E. Serror	Massachusetts.
Byron C. Shanks	Vermont.
Merton R. Sharpe	Connecticut.
Arthur Shaw	Nova Scotia.
Byron F. Staples	New Hampshire.
Geo. A. Sullivan	Massachusetts.
Chas. A. Vinal	Maine.
Ross Vroom	Nova Scotia.
Patrick B. Walsh	Massachusetts.
Robt. W. Young	Massachusetts.

DENTAL SOCIETY ANNOUNCEMENTS.

VERMONT BOARD OF DENTAL EXAMINERS.

A MEETING of the Vermont Board of Dental Examiners will be held at the Pavilion Hotel, Montpelier, October 18, 1899, at 2.30 P.M., for the examination of candidates.

The examination will be in writing, and include Anatomy, Physiology, Histology, Bacteriology, Chemistry, Metallurgy, Pathology, Therapeutics, Surgery, Materia Medica, Anesthesia, Operative and Prosthetic Dentistry, together with an operation in the mouth.

Candidates must come prepared with instruments, rubber-dam, and gold.

Applications, together with the fee, ten dollars, must be filed with the secretary on or before October 10.

GEO. F. CHENEY, *Secretary,*
St. Johnsbury, Vt.

NORTHEASTERN DENTAL ASSOCIATION.

THE fifth annual meeting of the Northeastern Dental Association will be held in Hotel Hamilton, Holyoke, Mass., on Wednesday and Thursday, October 18 and 19, 1899. The Executive Committee hope for and desire a large attendance, as their labors have been crowned with such success that the entire exhibit space has already been engaged. Essayists of prominence have accepted invitations enough to fill up all the time allotted. Clinics enough have been promised, and thus a meeting worthy of your attendance has been arranged. Be sure and save out the above dates and attend.

A cordial invitation is extended to the profession at large.

EDGAR O. KINSMAN, D.D.S., *Secretary.*

NORTHERN ILLINOIS DENTAL SOCIETY.

THE Northern Illinois Dental Society meets in Elgin, Ill., Wednesday and Thursday, October 18 and 19, 1899. A good program is in course of preparation, and all dentists of Northern Illinois are requested to be present, as a reorganization of the society is contemplated.

JAMES W. CORMANY, *Secretary,*
Mt. Carroll, Ill.

ILLINOIS STATE BOARD OF DENTAL EXAMINERS.

THE next meeting of the Illinois State Board of Dental Examiners will be held in Springfield, September 29 and 30, at the Capitol Building. Those who desire to take the examination will please notify the secretary two weeks previous to the time for the examination, Friday, September 29.

J. H. SMYSER, D.D.S., *Secretary,*
70 State street, Chicago, Ill.

EDITORIAL.

THE ANNUAL NATIONAL MEETINGS.

NOT since its organization has a more notable meeting of our National Dental Association been held than that which recently completed its sessions at Niagara Falls. Many forces have been at work for some time, all contributing to the end attained.

The immediate result was in large measure due to the energy and intelligent leadership of the president, Dr. Burkhart, who for months past has labored indefatigably to make the meeting a success, and his efforts have been amply rewarded.

In point of numbers in attendance, character of work done, and the interest manifested throughout its sessions, the meeting of 1899 has surpassed all its predecessors.

We believe, as we have previously contended, that the preparation of a full and interesting program and its publication well in advance are important factors in securing a large attendance and interesting meetings. A factor scarcely second in importance is the selection of an attractive meeting place. Both of these conditions were fully met in the present instance. The program was all that could be desired, and it was well advertised; Niagara Falls is always attractive, and, but for the insufficient accommodations, particularly so in the matter of an auditorium large enough for holding a meeting of this character, is peculiarly adapted for the purpose.

While the work accomplished by the 1899 meeting of the National Association from the technical standpoint is perhaps as valuable and important as anything heretofore accomplished by it, a still more important feature was the spirit which pervaded the whole gathering, evinced in a determination to wipe out a number of time-worn elements of discord and unite in an effort toward more harmonious work for the future.

For ten years or more the misunderstandings which have grown out of the conceptions regarding dental educational methods severally held by the representatives of our teaching bodies on the one hand, and certain of the representatives of the dental examining boards on the other hand, have given rise to much antagonism and bitterness of feeling which, during the formative stage of our thought on these subjects, seemed unavoidable. The focus of conflicting opinion was as between the National Association of Dental Faculties and the National Association of Dental Examiners. The *casus belli* originated, we believe, in the mistaken assumption that a national organization could be effected consisting of representatives of all the state examining boards, who by mutual agreement could formulate a code of rules affecting dental educational institutions which would be binding upon the state examining boards, and so legally control the whole dental educational system of this country. The essential defect in this scheme for centralizing educational power and creating an educational dictatorship in a national body is, as we have frequently pointed out in these pages, the antagonism of the national constitution to any system which directly interferes with the autonomy of the individual states in the free exercise of their police powers, or which interferes indirectly by the relegation of such powers to a national board.

The idea was an attractive one, as it seemed to furnish a short cut to the elevation of professional educational standards, were it not vitally defective on legal grounds and practically defective in that it gives no assurance that a national dictatorship or bureaucracy would be less liable to human error than the system of state sovereignty in matters educational to the extent now in vogue. The suggestion naturally found many advocates, who saw its good features without recognizing its defects, but the attempt to enforce it met with an opposition which gathered strength as it matured, until the issue was fairly stated and its basis of error fully exploded at the recent annual meeting of the two national bodies in interest. To the credit of both be it said that, notwithstanding the at times heated debates and the occasional intrusion of personal grievances which the discussion of the problem called forth, the general proceedings were characterized by a conciliatory spirit on both sides, so that good judgment and reasonableness determined the issue in a settlement of the difficulty honorable alike to both Faculties' and Examiners' Associations. The details of the settlement were arranged by a conference committee of both bodies, and are embodied in their report, which we give elsewhere in this issue.

The results of the deliberations of the conference committee are more far-reaching than are apparent from their report. The situation which makes a conference committee between these two important bodies possible is in itself an achievement pregnant with good for the educational interests of our profession. It means the development of a spirit of co-operation and the settlement of differences by arbitration, and not by strife. At no time in the history of these two bodies has so clear a realization of their mutual relationship been so generally apparent, and it would seem that now the ground has been cleared of obstacles which for years hampered a union of their efforts for professional betterment.

It is the consummation of the attempt at a settlement of the differences between the Faculties' and Examiners' Associations which will, more than any other event, make their meetings for this year notable beyond all others.

The social features of the general meeting were noteworthy, and it is perhaps not wide of the mark to regard them as contributing factors to the harmony of result achieved. The excursion of the delegates to Toronto at the invitation of the Royal College of Dental Surgeons was an event long to be enjoyed in memory. The hospitable entertainment tendered by the Dental Department of the University of Buffalo was likewise an element which added much to the pleasure of the meeting. Taken altogether, the Niagara meeting was an object lesson of what may be accomplished at our annual gatherings if each does his part, even if that part be no more than to add to the occasion by his presence. Now that we have achieved one success worthy of the name, let us surpass it at the Old Point Comfort meeting in 1900.

ET TU NEW JERSEY!

On the second day of the recent annual meeting of the National Association of Dental Examiners, this happened:

Dr. Adams, of New Jersey, presented the following communication, which was read by the secretary:

"Asbury Park, N. J., July 20, 1899.

"To the National Association of Dental Examiners.

"*Gentlemen,*—The State Board of Registration and Examination in Dentistry of New Jersey hereby with great regret tenders its resignation to your honorable body; the necessity for such action being set forth in the accompanying resolution, adopted this day.

"Most respectfully, G. Carleton Brown, *Secretary.*"

"*Resolution Adopted July 20, 1899.*

"*Resolved,* That as under the present law of the state of New Jersey, the New Jersey State Dental Commission is unable to live up to the rules of the National Association of Dental Examiners or accept its list of recommended colleges, thus placing the commission in a false position and working a positive injury to the Association of Dental Examiners, and jeopardizing legal action in other states, we should, out of justice to ourselves and honesty to the association, resign our membership therefrom; therefore be it

"*Resolved,* That our secretary be instructed to forward to the National Association of Dental Examiners our resignation as a member of the organization, with a copy of this resolution and our sincere regrets that such unforeseen complications should have made this action necessary.

"G. Carleton Brown, *Secretary.*"

We have not space in this issue to print the discussion which followed the reading of the foregoing communication, but that it came as a surprise to those present and even to one member of the New Jersey Commission is to state the facts mildly.

It is surprising in view of the active part heretofore taken by New Jersey in upholding the organization of the National Association of Dental Examiners that their representatives should suddenly discover their inability to live up to the rules of the National Association, rules which they have perhaps more than any others been active in framing.

The reason given for this action, as stated in the preamble, is that New Jersey "is unable to live up to the rules of the National Association of Dental Examiners," whereas in the ensuing discussion the implication is strongly made that New Jersey, because of its high standard, is unable to live down to the rules of the National Association of Dental Examiners.

At any rate, the reason appears to be a lack of harmony between the standard rules of the National body and those governing the New Jersey State Commission. But does New Jersey's position in this regard differ in essence from that of a large majority of the state boards represented and not represented in the National Association of Dental Examiners? We think not. It should have been discovered long ago that the formulation of rules legally controlling the action of state boards is not a possible function of a national organization. It always was so, and, as far as human foresight can detect, always will be so as long as the constitution of the United States of America remains what it is. Well, then, what is to be done about it? Disrupt the National Association of Dental Examiners because it cannot legislate for the states, and for that reason leave undone a work already begun and well developed for the general good of dentistry?

It would seem the part of wisdom, as in the case of Mahomet, after having discovered that the mountain cannot be moved to go to the mountain, and frame rules that the organization can exist under and carry on its legitimate work.

It would seem as though the New Jersey Commission were laboring under a misconception of their position, not only as regards their relation to the national organization, but as related to their state society, to which they owe their nomination. This latter fact is evidenced by the observation of one of their number that it is a mistake to think that the commission is "in any way amenable to the state society." Legally perhaps not, morally and by courtesy beyond a doubt, yes. The state society of New Jersey nominates, and the Governor appoints the commission. Boards so created are at least morally responsible to the profession whose representatives they are, and the profession is likely to so regard them. We present this matter because of the principles which it involves, and because we believe that the action of the New Jersey Commission is in no degree expressive of the better sense of the profession in that state. Fortunately the resignation was by vote laid over for action a year hence, and in the mean time the sifting of the matter which is sure to follow will doubtless evolve action more in harmony with the better thought of the profession in New Jersey, as well as elsewhere.

HISTORY REPEATS ITSELF.

In 1886 this journal directed attention editorially to the dangers attending the use of ethyl bromid, so-called hydrobromic ether, as an agent for the induction of general anesthesia. The occasion which led to the publication of an editorial note of warning was the occurrence about that time of a number of deaths in connection with the use of the anesthetic in question.

In view of the fatalities attending its use and the dissemination of authoritative data tending to show that ethyl bromid was a dangerous agent, its use for anesthetic purposes was apparently discontinued, or at least found no general acceptance.

Recently various attempts have been made to revive the one-time brief popularity of this drug and secure for it recognition as a legimate anesthetic agent, by claims that the dangers arising from its use heretofore were chargeable to impurities in the material as originally manufactured and used. Competent observers have given it as their opinion that, like chloroform, ethyl bromid kills by its effect upon the heart; that its effect is essentially poisonous, owing to the large percentage of bromin which it contains, and that its toxic effect when not immediately fatal is prolonged and dangerous not only to the heart, but to other vital organs, and notably to the structure of the kidneys.

Like chloroform, it is especially liable to produce fatal results when given in an upright or even semi-recumbent position, as in operations for tooth-extraction.

A recent fatal result of ethyl bromid anesthesia has occurred in Philadelphia, where the agent was administered by a physician for tooth-extraction in a patient where the preliminary physical examination showed no existing disease. The operation of extraction was done by a dental mechanic. The coroner's jury rendered a verdict of "shock and uremia while under the influence of an anesthetic," adding a rider censuring the operator, who was an unregistered dentist, "for practicing without being a graduate."

We call attention to this matter in the hope that the previous bad record of this treacherous agent shall not be overlooked by those who may be tempted to experiment with it as a general anesthetic in dentistry.

OBITUARY.

DR. CHARLES S. JONES.

Dr. Charles S. Jones, a well-known dentist, died suddenly, at his residence, No. 4116 Spruce street, Philadelphia, on Sunday, August 20, 1899, of heart-failure superinduced by a severe and long-continued attack of gastric fever.

Dr. Jones was born in Philadelphia in April, 1828. He had been connected with dentistry for more than forty years. About 1857 he entered the employ of Samuel S. White, and for a number of years had charge of the domestic sales of porcelain teeth. While so engaged he matriculated at the Philadelphia Dental College, from which he was graduated in 1875. He immediately began the practice of dentistry, in which he was successful, continuing his work until disabled by the illness which finally proved fatal. Dr. Jones was a skillful practitioner, more especially in the prosthetic branch. He was for several years demonstrator of mechanical dentistry in the Dental Department of the University of Pennsylvania, in which position he acquitted himself with satisfaction to the authorities of the college. He took great interest in Masonic work, and was at the time of his death Worshipful Master of Philadelphia Lodge, No. 72, F. and A. M.

On the outbreak of the Civil War he entered the army as a lieutenant in the Forty-third Pennsylvania Volunteers, and was promoted to captain.

Dr. Jones was never married. He was a man of quiet, retiring disposition, who preferred always to let his work speak for him; a conscientious man, to whom what he believed was right pointed out the duty to be done. These qualities, combined with his undoubted skill, gathered about him a clientele who believed in him, and formed a part of the circle of personal friends who will sincerely regret his death.

DR. LANSING S. SKIFF.

Dr. Lansing S. Skiff died at his residence in Salem, Oregon, March 8, 1899, from heart-failure incident to pneumonia, following an attack of grippe.

Dr. Skiff was born at Syracuse, Onondaga county, N. Y., March 12, 1822, his ancestors being among the Puritan settlers of New England. He received his education in the district schools. Turning his attention to dentistry, he studied and afterward practiced it in his native city; but the current of his life became affected by the fever of excitement that ensued upon the discovery of gold in California, and he left home scenes to become a pioneer in the new Eldorado. Making the voyage around Cape Horn, he arrived at San Francisco, September 17, 1849. After engaging in mining and mercantile pursuits for a few years he resumed in California the practice of his profession. He also maintained a dental office at Olympia, Washington.

In July, 1858, he opened an office in Salem, Oregon, and here he made his home from that time until his death, which removes from his community not only one of its most substantial citizens, but one who was to the fore in all enterprises calculated to advance its welfare.

Dr. Skiff was one of the most skillful and successful dentists on the Pacific coast. He was the founder of the Oregon State Dental Society, and served one year as president and two years as vice-president of that organization. He was married, in 1859, to Mary A. Gardner, of Linn county, Oregon, who, together with their three sons and three daughters, survives him.

On his retiring from practice, in 1895, his sons Mark S. and W. F. Skiff, who had been for many years associated with him, took charge of the office.

DR. R. A. KNEELAND.

Dr. Romulus A. Kneeland died at Benton Harbor, Mich., April 13, 1899, from bronchial tuberculosis.

He was born in Franklin, Delaware county, New York, August 11, 1848. At nineteen years of age he began the study of dentistry with Dr. Morgan, of Oneonta, N. Y. Practicing first in Unadilla, N. Y., in 1869, he removed to Franklin after five years, and here he remained, building up a large practice. Through failing health he was compelled, a few years ago, to seek relief from the strain of his Franklin practice, and he removed to Benton Harbor, residing there until his death. Dr. Kneeland was possessed of great musical talent, he and his twin brother, who survives him, having long been recognized leaders in musical circles, in which the deceased will be much missed.

He was married to Mary R. Randall, who, with three daughters, survives him.

DR. P. T. PEPIN.

Dr. Pierre T. Pepin died at Chelmsford, Mass., May 24, 1899, the cause of death being enlargement of the liver.

Dr. Pepin was born May 24, 1866, at St. Eli, Quebec, Canada. His knowledge of dentistry was acquired by a pupilage spent partly with his brother, Dr. J. V. Pepin, of Lowell, Mass., and partly with other dentists. He entered upon independent practice in October, 1889, at Berlin, N. H. He married, in 1888, Delia C. Rooney, of Lowell, Mass., who with their son, Percy, aged seven, survives him.

A MONTHLY BIBLIOGRAPHY OF DENTAL LITERATURE.

COMPILED BY J. MELVIN LAMB, M.D., D.D.S., WASHINGTON, D. C.

The abbreviations of titles used are those common to bibliographical work, and will, it is presumed, be readily comprehended by any one familiar with dental or scientific publications. Any explanation will be gladly furnished by the compiler. A star (*) indicates a thesis.

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LIST OF UNITED STATES PATENTS

PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING JULY, 1899.

July *4.*—No. 628,185, to Chas. W. Richards. Finger tooth-brush.
" " No. 628,222, to Wm. E. Hewitt. Vapor blowpipe.
" " No. 628,244, to Gustav Holtz. Adjustable dental chair.
" " No. 628,345, to Henry J. Miller. Artificial tooth.
" *11.*—No. 628,467, to Thos. C. Howlcroft. Dentists' or jewelers' drawer or tray.
" " No. 628,484, to Richard E. Mercer. Device for administering anesthetics.
" " No. 628,489, to Gustave Pertsch. Local anesthetic.
" " No. 628,524, to Henry Case and Edmund D. Shaw. Dental plugger.
" *18.*—No. 628,923, to John P. Carmichael. Rubber-dam holder.
" " No. 628,933, to Edmund D. Gilbert. Mercury holder.
" " No. 628,947, to Guido E. Lob. Speed regulator.
" " No. 629,321, to Hugo R. Knersten. Barber's or dentist's chair.
" *25.*—No. 629,324, to Chas. C. Allen. Dental dam.
" " No. 629,531, to Geo. B. Snow and Abel DeWitt Gritman. Dental articulator.
" " No. 629,621, to Geo. B. Snow. Dental plugger.

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ORIGINAL COMMUNICATIONS.

DISORDERS OF THE STOMACH IN RELATION TO CARIES OF THE TEETH.

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(Read before the Union Meeting in Baltimore, June 4, 1898.)

ONE of the principal objects of this paper is (in some degree at least) to more definitely define the relation that exists between disorders of the stomach (and especially indigestion) and dental caries, and to suggest such corrective measures as have proved beneficial in a large number of cases which have come under my care for treatment.

I do not assume to treat the subject exhaustively, nor to say the last word upon the subject.

That there is an existing relationship between the disorders of the stomach and the oral cavity, and especially the teeth, has been an accepted clinical fact for ages.

In the second century, in the year 131 A.D., Galen observed that there was some existing connection between the stomach and the teeth, for he said, "A lack of nutrition made the teeth thin, brittle, and weak."

Paul of Ægina in the sixth century, in the year 636, recorded a more definite observation upon the subject. He says that, "Indigestion is the cause of tooth decay." He treated it from a chemical standpoint, believing that the acid from vomit caused the destruction of the teeth.

My personal observation in a general way extends over a period of eight years and notice of over five hundred distinct cases, each of which was at the start suffering from and being treated for some disorder of the stomach. I did not employ the exact methods employed to-day. In their study I noticed only the number of persons possessing sound teeth in comparison to the condition of the digestive apparatus, the results of which I give later in this paper.

I have based my paper upon the results obtained by the study of fifty cases, each of which has disaffection of the stomach in some form, and of fifty cases which would ordinarily come within the precincts of a regular dental practice, irrespective of their general physical condition.

I employed the exact methods of investigation which are in use at the laboratory of hygiene of the Battle Creek Sanitarium.

The chemical and bacteriological research was conducted simultaneously, developing the special character of ptomaines and micro-organisms of the mouth and stomach as a result of bacterial growth. Limit of time, however, prevents me from mentioning in detail the characteristics of these organized bodies, whose growth is so prolific, especially in the oral cavity.

The stomach fluid is obtained by administering a sterile test meal consisting of one and one-half ounces of wheat granose flakes, seven and one-half grains of salt, and eight ounces of sterilized water. The test meal, together with the fluid of the stomach, is withdrawn by means of a stomach tube, the meal being allowed to remain in the stomach for one hour.

By these exact methods we are enabled to determine the qualitative and quantitative reaction of the digestive agents; also to obtain the products of fermentation, the coefficient of digestion, in addition to the residue of pus, blood, and the total estimated contents of the stomach fluid. We also obtain the number and general characteristics of microbes (if any) which inhabit the stomach.

With each case examined there is obtained a sufficient quantity of saliva, and by its study is ascertained whether it possesses an acid or alkaline reaction; and, if acid, what acid; also the degree of acidity is found. The results of eminent investigators along these lines have caused the statement to be made that three-quarters of our people are sufferers from some of the maladies to which the human stomach is subject, and the principal stomach disorder is indigestion.

After a study of several thousand cases of indigestion a leading authority, for convenience, has sub-classified indigestion into four divisions, as follows: Hyperpepsia, Hypopepsia, Apepsia, and simple Dispepsia, or normal. These may be further explained briefly, as follows:

Hyperpepsia is a condition where there is an excessive separation of the hydrochloric acid (HCl).

Hypopepsia is a condition where there is a deficiency of hydrochloric acid.

Apepsia is where digestive action is totally absent.

Simple Dispepsia (or normal) is where the work is normally done.

Without detailing experiments, it has been proved by others, as well as by my own investigation, that a normal or excessive quantity of free hydrochloric acid in the stomach fluid acts as an antiseptic in the gastric juice, thereby preventing putrefaction and fermentation, materially retarding the growth of any bacteria which inhabit the stomach.

I find, as my figures will prove, that where there is a normal or excessive quantity of hydrochloric acid in the stomach fluid the teeth are in far better condition than in those cases where a deficiency exists.

To determine the chemical action of hydrochloric acid upon the lactic acid of the saliva I had some experiments made, which reveal that in cases where lactic acid is found in large quantities, and still no serious disaffection of tooth-structure exists, the hydrochloric acid increases with and predominates over lactic acid.

It has been claimed that with an increased amount of hydrochloric acid the lactic acid was diminished, and *vice versa*.

The results of my observation were formed from thirty cases examined, as follows: Seventeen cases showed that the lactic acid increased with the increase of hydrochloric acid two per cent.; nine cases diminished one per cent., while four cases were found to contain normal quantities of both lactic and hydrochloric acid, showing that an average increase of hydrochloric acid in such cases proved to be an antiseptic to the lactic acid, thereby protecting or preserving tooth-structure.

It is supposed by many dentists that the normal saliva of a person possesses antiseptic properties, but that is disclaimed by Miller and others, who do share the opinion that normal saliva is a very efficient culture-medium for the development of micro-organisms in the oral cavity. The influence of a reasonable amount of hydrochloric acid counteracting the evil qualities of lactic acid bacteria can be readily perceived.

In the study of the fifty cases that came under my observation I secured the following preliminary data: Name, age, nationality, number of teeth in oral cavity, number of cavities, number of teeth filled and kind of fillings; also artificial teeth (if any), whether bridge or plates; number of devitalized teeth (if any); number of fistulous discharges from alveolar abscesses (if any); number of cases of pyorrhea alveolaris; time of noticed commencement of decay of the teeth, the functional disorder of the stomach, and the character of food used.

I found only two of the fifty cases examined that possessed the full complement of thirty-two teeth; the ages respectively of the two cases cited were seventy and forty-two years. This shows only four per cent. sound teeth out of the total. The first case mentioned had an alloy filling, simple buccal cavity of lower third molar, this being accounted for by the fleshy tissues of the cheek holding accumulations of food against that surface of the tooth. The chemical examination of the first case showed slightly *hyperpepsia*, or acidity of the stomach fluid, while the second case was found to be normal.

I wish to note at this time that in the first case there was a total absence of germs, while in the second case there was the minimum number found; of fifty cases thirteen hundred and eighty germs per cubic centimeter of stomach fluid. The average age was found to be forty-three years two months and ten days. Nationality, ten foreigners, forty Americans. Average number of teeth twenty-two. Average number of fillings ten, of which sixty per cent. were alloy and five per cent. oxyphosphates. The maximum number of fillings was twenty-five, of which twenty were gold and five alloy; the minimum zero, 0. Number of cavities of decay averaged only two or four per cent. Plates worn four or eight per cent. Ten persons wore bridge-work, which is twenty per cent. I found eight fistulous openings, from which more or less pus was discharged, sixteen per cent. I found nine cases of acute and chronic pyorrhea alveolaris, or eighteen per cent. Forty-eight of the fifty cases suffered from a disordered stomach in some of its various stages from acute or chronic indigestion. The stomach analysis of the two cases first referred to in this paper showed normal or simple dispepsia, the second case, however, proving deficient in quality of work; the quantity of both being one hundred.

Thirty-eight cases examined developed Hypopepsia, six Hyperpepsia, four Apepsia, and two simple Dispepsia. The average length of duration of decay of the teeth was found to be six and one-half years, while the average length of duration of stomach disorders was a trifle over two and one-half years.

The general conditions surrounding these cases were found to be better than the average. The character of food used in forty-eight cases, meats, vegetables, grains, teas, coffees, spices, etc. In the two cases first referred to the dietary of both had been fruits, nuts, grains, vegetables, with little meats, and in the past ten years their diet was that of a vegetarian's. All of these persons being those of the higher social scale of life, possessing more than ordinary intelligence, naturally caused them to employ greater sanitary and hygienic measures in both their diet and personality, and for that reason their mouths have been scrupulously cared for. This accounts for the low percentage of unfilled cavities of decay found. You will notice, however, that the number of filled cavities is considerably greater.

We also notice that the average number of stomach disorders is very high, being ninety-six per cent. The record of five hundred cases noticed in the beginning of this paper was made in reference to the full set of sound teeth in cases of disordered stomachs. Twenty-five of the total number possessed perfect organs of mastication; four of these were foreigners, leaving only fifteen Americans who had (as nature intended all of the human race should have) thirty-two sound teeth. This forcible illustration only serves to show to us our degeneracy as a people, and to remind us of the perversion of the essential laws of nature to satisfy a depraved appetite.

Of the fifty cases observed by me in my regular practice, with no known disability of the stomach, I found that the average number of sound teeth was about fifteen per cent. greater than the fifty cases where I employed the exact method of investigation. It is reasonable to assume, however, that some of these persons suffered in some degree from malnutrition or indigestion. I attribute the increased average of sound teeth and the absence of cavities of decay to a more hygienic dietary, and in consequence more perfect digestion than could be had by those who were victims of these disorders. Unfortunately, I did not have an unsanitary class of persons to formulate my observations from. I am positive if I had that the degree of oral disaffection in connection with disordered stomachs would have been much greater in proportion than it has proved to be with the class of persons I have employed in making my examinations.

The progressive deterioration of tooth-structure indicates the presence of a functional disorder of the digestion, and coincides with the observation of eminent authorities, wherein they claim that indigestion and gastric catarrh do act as causes of decay of the teeth, and particularly in the development of acid-forming germs that prove so disastrous to the welfare of the teeth.

Miller quotes ten causes for decay of the teeth. You will notice that the first two causes given have their origin in the stomach. They are as follows: 1. Depraved juices accumulated in the mouth. 2. Disturbances of nutrition. 3. Inflammation. 4. Worms. 5. Putrefaction. 6. Chemical dissolution. 7. Parasites. 8. Electric decomposition. 9. Chemico-parasitic influences. 10. Divers causes.

The etiology of caries of the teeth as accepted by Black, Peirce, Sudduth, and others is that there is produced in the mouth a low form of living organism producing destructive acid.

Dr. Miller makes the assertion that all processes of putrefaction and fermentation depend upon the presence of microscopically small living organisms. The most destructive organisms found in the oral cavity are lactic acid forming germs, and the chief source of nourishment of the micro-organisms of the human mouth is furnished by two groups of substances, carbohydrates and albuminous substances, both of which are invariably present in the mouth. It has been shown by post-mortem examinations that agglutinated mucus containing bacteria of various kinds lines the walls of the alimentary canal from the stomach to the oral cavity. By this means and through atmospheric influences of respiration bacteria of various forms are deposited upon the tongue and the teeth. It is an undisputed fact, established by those who have investigated the subject, that micro-organisms are the prime factor in the decay of the teeth. Hundreds of different colonies of the germs have been isolated by Miller, and knowing that the oral cavity is the culture-medium for their development of the entire body, it being the portal of their introduction, we should discuss the subject with deliberate candor, ascertain the causes, the food substances most favorable to these destructive agents, the cause of the functional disturbances referred to, and note also what effect those functional disturbances have upon and among the agencies so destructive to the teeth.

It serves to show us as dentists the importance of the maintenance of a sterile condition of the mouth and stomach, and that the food should be of a wholesome character, so that if germs remain in the mouth and stomach the prophylactic measures may prove sufficiently effective.

We have some general as well as specific laws of nature to govern us in the application of corrective measures. We also have gained some general information which, if adopted, would prove beneficial. We have already acknowledged that every human mouth has permanent bacteria inhabitants, each of which produces a different effect on soft as well as hard tissues of the mouth, and many times prove disastrous to all tissues with which they come in contact.

It behooves us to prescribe the proper antiseptic, proper dentifrice, good tooth-brush, with silk ligatures, together with instructions how and when to use them.

I have noticed that the greatest factor which favors the formation of those bacteria which cause caries of the teeth as well as destroy a healthy stomach is the unwholesome character of food introduced into the body for nourishment, and herein lies the nucleus of my paper.

The results attained from the various experiments which have been made, and some of which are outlined in this paper, prove conclusively that the fundamental cause of bodily disaffection is in the material taken into the body to nourish the various tissues and organs. It has been well said, "As a man eats, so is he." I hope to convince you that a perversion of nature exists in the manner in which fast livers, especially Americans, are eating themselves to decay and ultimate death. There is no reason why, if a man follows the laws of nature closely, that he should not live centuries, instead of two or three score of years.

In comparing the various food substances in this table I find them to be as follows:

NUTRITIVE VALUES OF VARIOUS FOODS.

Food Substances.	Albuminous.	Carbonaceous.	Salts.	Total Nutritive Value.
Bread	8.1	52.6	2.3	63
Wheat flour	10.8	72.5	1.7	85
Barley meal	6.3	76.7	2	85
Oatmeal	12.6	69.4	3	85
Rye meal	8	75.2	1.8	85
Indian meal	11.1	73.2	1.7	86
Rice	6.3	80.2	0.5	87
Peas	23.8	60.8	2.1	86.7
Beans	30.8	50.2	3.5	84.5
Lentils	25.2	58.6	2.3	86.1
Arrowroot	..	82	..	82
Potato	2.1	22.2	0.7	25
Sweet potato	1.5	27.5	2.6	31.6
Carrot	1.3	14.7	1	17
Beet	1.5	11.3	3.7	16.5
Parsnip	1.2	15.9	1	18
Cabbage	0.9	4.1	0.6	5.6
Turnip	1.2	7.2	0.6	9
Sugar	..	95	..	95
Treacle	..	77	..	77
New milk	4.1	9.1	0.8	14
Cream	2.7	29.5	1.8	34
Skim milk	4	7.2	0.8	12
Pork	9.8	48.9	2.3	61

Food Substances.	Albuminous.	Carbonaceous.	Salts.	Total Nutritive Value.
Lean mutton	18.3	4.9	4.8	28
Lean beef	19.3	3.6	5.1	28
Veal	16.5	15.8	4.7	37
Poultry	21	3.8	1.2	26
White fish	18.1	2.9	1	22
Salmon	16.1	5.5	1.4	23
Entire egg	14	10.5	1.5	26
Banana	4.8	20.2	0.8	25.8
Date	9	58	..	67
Grape	0.8	14.3	0.3	15.4
Apple	0.2	10.3	0.4	10.9
Pear	0.2	10.2	0.3	10.7
Peach	0.4	7.8	0.4	8.6
Plum	0.2	9.3	0.6	10.1
Cherry	0.9	15.3	0.6	16.8
Blackberry	0.5	5.8	0.4	6.7
Gooseberry	0.4	8.9	0.3	9.6
Strawberry	0.3	7.1	0.4	7.8
Raspberry	0.5	6.4	0.5	7.4
Currant	0.4	5.0	0.5	5.9
Dried Fruits.				
Prune	2.3	25.4	1.4	69.2
Pear	2	27.3	1.7	63.7
Apple	1.3	42.8	1.6	67
Cherry	2	22.9	1.6	49.4
Raisin	2.4	26.1	1.2	66.3
Fig	4	12.4	2.9	56.7
Date	9	6.4	..	67
Nuts.				
Chestnut	14.6	4.8	3.3	89.3
Walnut	15.8	4.4	2	88.2
Hazelnut	17.4	4	2.5	89.7
Sweet almond	23.5	2.6	3	87.3
Peanut	28.3	1.7	3.3	79.6
Cocoanut	5.6	7.8	1	50.5

We find the greatest nutrient values are in nuts, grains, and vegetables. In a healthy state we find no bacterial contamination in them. They are pure. You will notice that nuts are the most nourishing and fattening of all food substances, while fruits are nature's own antiseptic. To prove this last statement let a person with a coated tongue, who perhaps has not had the micro-organisms removed from it for years, and would not recognize it uncovered, subsist wholly upon fruits for five or six days, and the coating, which consists of a prolific growth of germs, will disappear.

I was astonished a few days since upon examining and cleaning a set of teeth for a man about thirty years of age to find a perfectly sterilized condition. I asked him what prophylactic measures he used. He said, "I consume the juice of a lemon once a day." I tried to produce a culture from his mouth, but failed.

It hardly seems necessary for me to say to you that a majority of the micro-organisms found in the oral cavity of the entire body are introduced through the channels of food and air, and owe their existence to meats, particles of food that lodge between the teeth, cheese, and many other varieties of decomposed food alive with bacteria; that the primary cause of all diseases is the inordinate and unnatural diet of mankind.

All foods in which putrefactive processes and living micro-organisms innumerable are always present should be totally discarded, not being suited to the delicate digestive and comparatively feeble disinfectant or sterilizing power of the human stomach, which is so certain to result in the deterioration of the vital resistance of the teeth, ultimately resulting in their succumbing to decay.

I will call your attention to the digestibility of the various foods and time required, showing that fruits are by far the most easily digested:

Digestibility of Various Foods.

	Hr.	Min.		Hr.	Min.
Rice	1	00	Fowl, boiled	4	00
Sago	1	45	Duck, roasted	4	30
Tapioca	2	00	Butter, melted	3	30
Barley	2	00	Cheese	3	30
Milk, boiled	2	00	Soup, marrow-bone	4	15
Milk, raw	2	15	Soup, bean	3	00
Venison, broiled	1	35	Soup, mutton	3	30
Turkey, roasted	2	30	Corn and beans, green	3	45
Turkey, domestic, boiled	2	25	Soup, chicken	3	00
Goose, roasted	2	30	Beans, pod, boiled	2	30
Lamb, broiled	2	30	Bread, wheaten	3	30
Eggs, hard-boiled	3	30	Bread, corn	3	15
Eggs, fried	3	30	Apples, sour and mellow, raw	2	00
Eggs, raw	2	00	Apples, sweet and mellow, raw	1	30
Eggs, whipped	1	30	Parsnips, boiled	2	30
Trout, boiled	1	30	Beets, boiled	3	45
Salmon, salted, boiled	4	00	Turnips, flat, boiled	3	30
Oysters, raw	2	55	Potatoes, Irish, boiled	3	30
Oysters, stewed	3	30	Potatoes, Irish, baked	2	30
Beef, lean, rare roasted	3	00	Cabbage, raw	2	30
Beefsteak, broiled	3	00	Cabbage, boiled	4	30
Beef, lean, fried	4	00	Bananas	1	20
Beef, salted, boiled	4	15	Oranges	1	70
Pork, roasted	5	15	Pears	1	30
Pork, salted, fried	4	15	Plums	1	40
Mutton, roasted	3	15	Strawberries	1	15
Mutton, broiled	3	00	Whortleberries	1	10
Veal, broiled	4	00	Raspberries	1	30
Veal, fried	4	00			

The solid foods require from two to five hours. Soft foods, such as mush, soups, bouillons, etc., should be religiously left alone. The teeth, as well as the soft tissues of the mouth, must have vigorous exercise for the development of healthy teeth and gums, as well as other tissues of the body. As a result of employing soft foods as a principal diet I would refer you to the sad condition of the people who inhabit Pitcairn Island, one of the islands of the Pacific group. There are about one hundred of them, and it was found necessary to substitute artificial teeth in nearly every adult case, and it is attributable solely to a soft diet.

A prominent writer recently said that the rapid and premature decay of the teeth in civilized countries was principally due to the excessive use of meats and soft foods. It has led us in this time to a full realization of the dreams of Giles Corey, who nearly two hundred years ago was put to death by witchcraft, and who said,—

"I saw a man pull all his teeth,
It took him but a minute;
He opened his mouth and put them back;
I thought the deuce was in it."

Dental caries, as is well known, is exceedingly rare among savages, primitive people, and the lower animals when fed upon a natural dietary, but among civilized people everywhere, and particularly among the wealthier classes, dental caries is advancing at an alarmingly rapid rate, in spite of all prophylactic measures employed and the services of the thousands of skilled dentists. There is certainly room for the query whether there are not excellent prospects not many centuries hence when the entire human race will become entirely toothless and dependent upon artificial means for the mastication of foods. This question is of too great proportions to do it justice in the time allotted, and I do not pretend to canvass the subject from all of its respective bearings; but, believing it to be the great and momentous problem of the dental profession of the present and future to solve, I have brought these few facts before you, hoping that more extended observation and investigation may be generated whereby further light may be reflected and mutual benefit gained for both our patients and ourselves.

The facts I have endeavored to place before you may be summarized as follows:

First. That vegetarians, savages, primitive people, and lower animals have the most sound teeth.

Second. Dental caries is always present in chronic cases of indigestion.

Third. Only two persons out of fifty were found to have sound teeth; neither case was a dyspeptic.

Fourth. Highest degree of absence of dental decay was found to be where there was present a normal or excessive amount of free hydrochloric acid in the stomach fluid.

Fifth. The mouth is the culture-medium of the body for the growth and development of bacteria.

Sixth. That in cases of vegetarians dental caries is almost totally absent.

Seventh. That the employment of soft food encourages deterioration of the teeth, developing disorders of indigestion.

Eighth. That wholesome, digestible food substances, free from bacteria, promote good digestion and preserve the natural teeth.

REFLEXES FROM LOWER MOLARS.

BY JAMES TRUMAN, D.D.S., PHILADELPHIA, PA.

(Read before the National Dental Association, August 1, 1899.)

THE causes of reflex disturbances have been sufficiently studied as a collateral branch of dental pathology, and it may seem a useless expenditure of the time of this organization to attempt to add anything to the literature of the subject.

When the student of dental lesions comes to investigate the various books that are supposed to treat upon the reflexes of the teeth, he finds himself narrowed down to a small compass. He may critically examine all the works on dental pathology and oral surgery issued in the English language in recent years, to be surprised with the fact that where this subject received extended notice it has been mainly confined to infantile dentition, or it has been regarded as of secondary importance; and by some it is held to be one unworthy of pathological consideration.

The eruption of the permanent molars, aside from their histological interest, has secured but slight attention. It is true that the consideration of the intimate connection between the lesions occurring in teeth and the neuroses of the fifth nerve have of recent years been more thoroughly studied, but it has been more from the histological side; hence formations in the pulp, as these enter into daily practice, have received a full degree of attention from dental writers. The exceptional conditions are, however, passed by as of minor importance, or they have been entirely overlooked.

It is somewhat strange that the lesions of dentition have been treated by the majority of medical writers with slight consideration. The opposition of the medical to the generally accepted position of the dental profession, that the reflex disturbances of dentition are of vital importance, can be understood, for medicine until very recently has entirely underrated, if it has not entirely ignored, the oral cavity as a source of disease. This should not, perhaps, be regarded as remarkable, since the origin of disease in general has only been studied scientifically during the past twenty-five years, and is even now in its infancy. Medicine has been based upon symptomatology; the effect, and not the cause, receiving much attention. It is therefore not a special source of wonder that the neuralgias, the tissue disturbers, the new foci of inflammation having their origin in the teeth, have received only a moderate degree of thought. While this is true of medicine in general, the specialist, the stomatologist, must share the responsibility of neglect.

The views that this paper proposes to consider are, in the main, written to enforce the idea that more attention should be given to the eruption of the molars than has been accorded them. The same laws of growth are manifested here as in the first dentition, and are equally responsible for serious disturbance along the course of nerve connections. Consideration will alone be given to the lower molars, for the question of growth does not apply with equal force to the upper set. It is, however, recognized that nerve irritation proceeds from these as it does from all the teeth disturbed from their normal relations.

The process of growth, whether in vegetable or animal tissues, is one of the most interesting in nature. John Tomes ("Dental Physiology and Surgery," 1848) in writing of this force says, "It would be difficult to estimate the actual amount of mechanical force developed by a growing tooth, but we may form some estimate by observing the force generated by a growing vegetable." If this force of growth be applied to the teeth, and it must be so applied, it can be well understood why in dentition reflex disturbance occurs.

The whole question of treatment might be condensed into the word *room*. With space sufficient for the development of teeth, all dentition would simply be a physiological and not a pathological process. It is therefore a question of space or room for development.

Growth proceeds from the first layer of enamel and dentin to the last of cementum, and in proportion as the enlargement proceeds must the teeth be given space for their formation; and to accomplish this, the gumward advance must be regular and with no opposing obstacles. In deciduous dentition these are confined to the gum-tissue, and these teeth are, equally with the permanent, a source of reflex disturbance.

The student of these phenomena has, therefore, a comparatively simple problem to solve. His duty is first to study the anatomy of the jaw and the process of growth in the jaw primarily, and to follow this by that of the teeth. He cannot omit in this consideration the position of development and the resulting changes that take place in its progress.

The beginning of development of the first permanent molar takes place about the tenth week of fetal life, and from this period until the sixth year subsequent to birth it is gradually formed into the largest molar of the series. The broad occlusal surface of this tooth would seem to indicate that at this period of eruption it would be a special subject for pathological disturbance, but, as is well known, it is less frequently a source of reflex disturbance than any other of the developing permanent teeth in the inferior maxilla. If the jaw has been examined it will be found that this exemption is clearly explainable by the width of the jaw, measuring from the overlying gum-tissue to the inferior dental canal. The only obstruction to receive serious consideration is the tense overlying gum. This, while resistant, gradually yields to pressure, resorption taking place; and, while it may retard eruption, it cannot as a general rule cause pressure upon the exposed pulp, or upon the inferior dental nerve. Hence there is a marked and almost uniform freedom from neuroses in this tooth, and it may be passed as an unimportant factor in pathological disturbance.

The second, or, as it is commonly misnamed, the twelfth-year molar, has an entirely different place in development, and in consequence more fully exemplifies the importance of room for growth than any of the series, not even excepting the third molar, which is usually regarded as the prime factor in neuralgic lesions. In an extended examination of the literature of the subject, nowhere have I found this tooth noticed as a cause of reflex conditions. It is therefore worthy of study in its several relations,—origin, development, and eruption.

The growth of the jaw posteriorly carries the germs of these teeth well up in the rami, and as development proceeds, both in jaw and teeth, there is a gradual descent toward the angle of the jaw. The period of passing this point, through development of the latter, to assume the direct vertical position is the critical period. At this time the crowns are fully formed externally, and the roots have developed to half their normal length. If the growth of the jaw is in harmonious relation to the development of the teeth this period may be passed without notice, but this is not always the case. The growth of the roots may have progressed more rapidly than that of the jaw, and in passing the angle they may, and frequently do, impinge upon the inferior dental nerve; or the exposed pulps may possibly be forced by the exceedingly tense gum against the bone envelope, in either case resulting in serious reflex suffering to the individual. The passage of this critical point by these teeth occurs about the ninth year.

The characteristic phenomena at this time are marked cerebral disturbance, resulting in convulsions, epilepsy, chorea, insanity, hysteria, otalgia, ocular diseases, and a long list of more or less aggravated lesions. In the before-mentioned work of Tomes the author gives this as his opinion on reflex manifestations: "Before serious and painful results can arise there must be a concurrence of many circumstances. The patient must be of a strumous constitution or predisposed to inflammatory action, or the nervous system must be peculiarly susceptible to excitement. In the latter case epileptic fits may supervene. . . . That epilepsy does arise in some cases from this cause is proved by its appearing when the teeth are passing toward the surface and disappearing when passage is given to the teeth."

Dewees ("Physical and Medical Treatment of Children") makes this admission: "And though the teeth cut (lanced) upon may yet be remote from the surface, still the operation may be of the greatest possible advantage by dividing the membrane . . . and the disturbance of the system is quieted from the moment the gum is divided." That the phenomena have been attributed to other causes is not surprising, in view of the fact that comparatively slight attention has been given to dentition as a whole, and the permanent teeth in particular.

That this statement is not based on mere conjecture, attention is called to the anatomical relations of the second molar with the jaw. A very cursory examination will bring conviction as to the truth of the conclusions to which I have arrived. My attention was originally called to this tooth as a prominent cause of reflexes at this age by several cases coming under care, which led to a more critical examination to discover if possible the cause and the remedy.

It is a well-understood fact by the more advanced dental observers that the nervous disturbances at this age, about nine years, have generally their origin in the teeth, and so certain are these as to the cause that the intelligent practitioner never fails to examine for obstructed dentition when called to diagnose a case. Dr. C. N. Peirce mentions a case, a child of a distinguished physician, and afflicted with chorea. The cause was diagnosed as a retained deciduous molar. The father was not able to comprehend that this retention could cause the nervous symptoms in the child. The extraction, however, demonstrated the diagnosis to be correct, as all reflex phenomena ceased.

In the case of the second molar, as well as others similarly situated, the relief must come by affording room for growth.

It is apparent that this is a difficult procedure with this tooth. It is deeply imbedded in the surrounding tissues, and it would seem impossible to afford any immediate relief. The first case which presented and claimed serious consideration was a member of my own family. At the ninth year this child was, without apparent cause, affected with violent convulsions that assumed an epileptic character. The seizures were prolonged, but days frequently intervened between them. The study given the case developed the hypothesis that the second molar was the pronounced factor in the cerebral disturbance. To verify this theory the child was carefully watched, and upon indications of an approaching nervous storm the lance was deeply inserted over the position of this molar. The result was entirely confirmatory of the diagnosis, and by care in watching symptoms and a repetition of the lancing whenever necessary the child passed the critical period without further reflex phenomena. Since that time other cases have been under my care, and the same simple method of treatment has been followed with equally good results. During the present spring a child of nine years was brought to me suffering intensely with pain in both ears. Examination of the teeth failed to show any cause for this in exposed pulps or other lesions. These having been excluded from the possibility of causing the suffering, it was decided that the origin of the pain was reflex and must be from pressure upon the pulp of the partially developed second molars, or impingement of both upon the inferior dental nerve. The lance was at once applied to both, right and left, with immediate relief, and without any subsequent recurrence of pain now several months since the operation was performed.

There is, therefore, no question in my own mind that dentists are called to watch carefully the development of the second molar in childhood, and advise the only remedy,—free lancing.

The books are full of the sage advice that lancing should not be performed until the tooth manifests itself by forcing the gum above it into a rounded prominence. Lancing is indicated at all stages of development, whether upon the deciduous or permanent teeth, and should be resorted to as frequently as the symptoms indicate reflex phenomena. Dr. Dewees (quoted previously) recognized this, and he is the only medical writer with whom I am familiar who has comprehended this important point.

The third molar is so frequently the cause of reflexes that it would seem almost a useless expenditure of time to reiterate a well-known fact, and yet an examination of all the books on dental pathology and oral surgery reveals a great deficiency in the treatment of this subject. While this is true, I must refrain from its extended consideration here. Suffice it to say that these teeth, like the second molars, find their place of origin in the rami of the inferior maxilla, and have difficulty in assuming the direct vertical position. The two principal positions assumed by this tooth causing general nervous irritation, are the oblique and the horizontal. The former is not a frequent cause of reflexes, and, while it may produce these by impingement upon the inferior dental nerve, it more often effects this by producing unobserved decay at the cervical border of the second molar, and eventually pressing upon the pulp. The difficulty of diagnosticating this must be evident, for as decay proceeds the tooth advances, filling completely the cavity and causing the lesion to be overlooked until neuralgic pains indicate some cause requiring the attention of the dental surgeon.

The most serious of all the malpositions of this tooth is the horizontal. The tooth in passing down from the ramus strikes the posterior root of the second molar, and there must stop. Deeply imbedded in the jaw, with the roots closely impinging on the inferior dental nerve, there is but one possibility, that of pressure upon that nerve, and that continually and more forcibly as growth proceeds. The reflex lesions are, as you are well aware, of the most serious character. The important matter to consider here is the diagnosis.

It is quite evident that a tooth thus situated produces its disturbing effect through lack of room, and that this room cannot be secured as long as all the teeth on that side are in place. If, then, the entire series, from the second molar to the cuspid, are in position at the age of eighteen to twenty-four, with lancinating and intermittent pains extending throughout the fifth pair, and with no visible signs of a developing tooth, it is evident that the third molar is abnormally developed in the position named. An explorer passed down posterior to the second molar will settle this fact. If, however, the second be absent, or it is in place and the first molar absent, it remains reasonable that the third molar is not the cause of the neuralgia. The force of growth, as before stated, is quite sufficient to change the second molar from its normal position, and thus give room for the development of the third molar. If, however, both first and second molars are in place, the inference may be drawn that the third molar will not have sufficient force to move two such powerfully implanted teeth far enough to afford relief.

The importance of this malposition cannot be overestimated. Forget mentions a number of serious cases, and almost every practitioner of dentistry has seen cases of obscure reflex pain which may not have been fully comprehended. There is no lesion more easily treated than this, and yet it is one the general surgeon fails almost universally to diagnosticate correctly. A case which I reported many years ago may be worth repeating here as an illustration of this statement. A patient was sent to me for examination for a most obstinate case of neuralgia which had resisted medical and surgical care for twenty years. The physician who sent her expressed himself as hopeless of having her relieved. The woman was a physical and almost a mental wreck. Feeble and emaciated, vision very defective, hearing with difficulty, she presented a most dejected and hopeless appearance. The examination of the mouth gave no indication of a third molar. All the other teeth were in place. An explorer was passed down posterior to the second molar, and the third was found occupying a horizontal position abutting against the roots of the second molar. The patient was informed that the only remedy was the extraction of the second molar. No opposition was made to this, and the tooth was at once removed.

The effect was immediate, all pain ceasing, and in twenty-four hours the third molar had advanced and filled up the socket of the second molar. The patient in a month's time had recovered her hearing, the eyesight was greatly improved, and her physical and mental state had resumed normal conditions, pain having ceased entirely. She should have been saved this twenty years of torture.

At the time this case was under care the X rays were an unknown factor in diagnosis. It is unnecessary to state here that this at present would have decided such a malposition with unerring certainty. This paper is not, however, written for the favorably situated in large centers of population, where this aid can readily be obtained, but for those in isolated practice who will need to decide cases by the older and perhaps obsolete methods.

The reflexes from dentition, exposed pulps, calcification in pulps, and from other causes, have received due attention from various writers, but those interested will find very full reports of cases given by Brubaker ("American System of Dentistry"), Arkövy, "Diagnostik der Zahnkrankheiten," in an appendix prepared by Dr. Georg Creniceneau, and also in Wedl's "Pathology of the Teeth." It is therefore not deemed necessary to do more than allude to the fact that the recorded cases are so numerous that he who fails to recognize their importance is not fully grounded in the pathological possibilities contingent upon the abnormal changes in teeth. The subject is still obscured by imperfect observations, but sufficient is known to afford a basis for intelligent practice.

The reflex disturbances occasioned by the various recognized lesions have not been considered, as these are well understood and require no further elucidation. The main purpose of this paper has been to direct thought upon this subject, and more especially to two facts: first, that relief should not be delayed until the teeth manifest themselves at the gum-border, but in all cases of disturbed dentition, whether it be with deciduous or permanent teeth, the lance should be freely used, and that at the first symptoms of reflex disturbance; and, secondly, to call attention to the wholly neglected second molar as a cause of many of the serious reflexes about the ninth year.

THE MANAGEMENT OF CHILDREN'S TEETH.

BY C. N. JOHNSON, L.D.S., D.D.S., CHICAGO, ILL.

(Read before the National Dental Association, August 1, 1899.)

THIS subject presents itself in two phases for our consideration from an operative point of view,—the care of the deciduous teeth, and the care of those of the permanent set which may be said to appear in childhood. The problems which confront the operator in the one case are not precisely the same as those in the other, and the intelligent practitioner will study the two situations from a somewhat different basis. The object in the management of the deciduous set is merely to do palliative work, with the idea of keeping the patient comfortable for a period of a few years, rather than to undertake thorough, permanent, and artistic operations. The avoidance of pain at this age is very important, and this of itself often involves the performance of temporary work. While the operator is not by any means free from this restriction in his management of the permanent teeth, particularly those which appear early, yet his aim as he approaches these should be in the direction of attaining the greatest possible permanence to his operations, with the idea ever in mind that the highest possibilities of his art involve the saving of these organs for a lifetime.

Management of the Deciduous Teeth.

The impression among many of the laity that these teeth may well be neglected, so far as operative procedures are concerned, on the basis that they are eventually lost through natural processes, should be corrected by the profession at every opportunity. Beyond the patent fact of much possible suffering on the part of the patient and much injury to the health through neglected and abscessed teeth, there is a question of habit which would seem to have an important bearing on the future welfare of the patient. These little folk are very impressionable at such a tender age, and readily acquire habits which may conduce to either their permanent benefit or injury. If a deciduous tooth decays and is allowed to go without attention, it sooner or later becomes sensitive to the impact of food in mastication, and the little patient often, without being able to explain the real source of the discomfort, intuitively avoids chewing upon the side of the mouth affected. This leads to imperfect mastication, and where there are several sensitive teeth in the mouth it may lead to an almost entire cessation of mastication; so that a process of bolting the food is inaugurated which may, and undoubtedly often does, cling to the patient as a habit through life.

If a close observer will carefully note the workings of mastication in the mouths of the individuals he meets, he may of course get a reputation for rudeness, but he will also be impressed with the variations in the methods practiced and the degree of effectiveness exemplified in the different mouths. These variations occur in individuals who have teeth of relatively equal efficiency, so that they must be traced largely to matters of habit; and it is natural to conclude that these habits were formed in childhood. When it is considered that effective mastication is a weighty factor in the health and longevity of the individual, it may be seen how important it becomes that we keep the teeth of children in a condition comfortable under the trituration of food and conducive to habits of thorough mastication.

A child should be brought to the dentist at regular intervals for examination from the time of the third, or at latest the fourth, year of age. The first operation usually necessary is fortunately that of cleaning the teeth, and this may be accomplished as a sort of a frolic on the part of the little patient and without any pain. If the teeth are cleaned several times before any filling becomes necessary the dread of the dental chair is largely overcome, and filling operations are undertaken with a better prospect of success.

The materials to be used for filling the deciduous teeth are ordinarily limited to gutta-percha, cement, and amalgam. For the anterior teeth cement must be considered the chief reliance, on account of the nature of the decay which usually attacks these teeth. The cavities are for the most part shallow and not well defined in outline, nor is it possible in many instances to establish a perfect outline or trim to a well-formed margin. After the removal, more or less thoroughly, of the decay, the filling must be plastered against the decayed surface and remain of its own adhesive properties. Cement is the only material which can be relied upon to do this, the fact that it is necessary to renew it occasionally being its chief limitation. It is ordinarily not a very difficult problem to save the deciduous incisors and keep them comfortable till the eruption of the permanent ones, on account of the early age at which they are shed; but the care of the deciduous molars becomes a more serious matter. They are usually retained four or five years longer than the incisors, and those years are sometimes very trying both to patient and operator. Occlusal cavities in these teeth are ordinarily easily managed with either cement or amalgam, the choice being governed by the degree of thoroughness with which the cavity may be excavated without pain. If a good preparation can be made, and the pulp is not too nearly involved, amalgam should be used on account of its greater permanence, but in some instances the teeth are so sensitive that the most that can be accomplished is to break down the thin overhanging enamel-walls, remove the softer portions of the carious dentin, and force cement into the cavity. When cement is used under these conditions it should be placed in position with considerable pressure. It should also be used in such excess that the entire occlusal surface of the tooth is covered even beyond the borders of the cavity, so far as this may be done without interfering with the occlusion. To accomplish this conveniently, and also to protect the filling from moisture for a few minutes without stuffing the mouth full of napkins or absorbent rolls, the index finger of the operator may be brought down upon the cement as it lies on the tooth and the whole occlusal surface subjected to pressure, so that the cement will be forcibly carried into every groove or inequality on this surface and the excess be squeezed out over the marginal ridges of enamel. If the finger be held upon the cement a few minutes the result is a filling which not only includes the cavity itself, but also protects the grooves and other vulnerable points radiating from it.

The problem of chief concern in the care of these teeth relates to the management of occluso-approximal cavities. There are two factors which tend to make these cavities especially difficult to control,—the almost universal sensitiveness which we find present, thus preventing an adequate preparation of the cavity to retain the filling, and a gradual separating of the teeth from the natural expansion of the jaw, so as to lead to constant complaint on the part of the patient of food wedging between the filling and the approximating tooth and lodging in the interproximal space. This discomfort is often manifest as the teeth drift apart, even when no decay has occurred, but it is particularly annoying between filled teeth where it has not been possible to contour sufficiently to maintain perfect contact with the approximating tooth. The insecurity of anchorage usually imposes upon the operator the alternative of making fillings with limited contour, and this soon leads to a pocket between the teeth, which proves a constant source of discomfort.

Ordinarily where the approximal surface of a molar is decayed the approximating surface of the one next to it also becomes involved, and this complicates matters so far as making separate fillings is concerned. In desperate cases, where both teeth are decayed, it may be advisable to bridge across the interproximal space and join the fillings together. This will at once do away with the difficulty of food wedging between the teeth, and will often prove a relief to the patient where separate fillings have been a failure. But there are only two materials which are suitable for this purpose. If cement is employed it is only a matter of a few weeks when the whole mass is found loose between the teeth, so that the operator is limited to gutta-percha and amalgam. If the former is used it will ordinarily not draw away from either cavity, and it is excellent as a temporary expedient, but it is so easily worn out that it is at best only a makeshift. Amalgam is probably the most serviceable material for these cavities. It is not worn away by attrition, and will remain more securely fixed than cement, thougl in some instances the case will present in a few months with the filling loosened from one of the cavities while the other remains firm. The reason for this lies in the individual movement of the teeth, the one with the lesser retention giving way.

A great aid in securing firmness of these fillings when joined together, no matter which material is used, is to first place a metal bar across the interproximal space, with one end resting on the cervical wall of one cavity and the other on the cervical wall of the other, and building the fillings around and over it. This locks the teeth together more securely, and affords perfect protection to the gum. These bars may conveniently be made from German silver wire rolled flat, and cut to a suitable length for the case in hand.

Treatment of Exposed Pulps in Deciduous Teeth.

When a pulp becomes exposed in a deciduous tooth, it is seldom advisable to make an application for its destruction. If the patient applies with pain this can ordinarily be quickly relieved by syringing the cavity well with tepid water to remove loose *débris,* and carefully clearing away with a spoon excavator any hard material which may be causing pressure on the pulp. This is to be followed by an application of oil of cloves on a pledget of cotton about the size of the head of a pin, covered with dry cotton to fill the cavity. When the pain is relieved, it is better to treat the tooth in a palliative way than to subject the pulp to the action of drugs sufficiently powerful to work its destruction. Arsenic should never, under any circumstances, be used in a deciduous tooth. The risk is too great of doing serious injury to the surrounding parts, and the necessities of the case seldom call for any such radical treatment.

An exposed pulp may be treated by flowing over it a paste made by mixing oil of cloves with the oxid of zinc or the powder which comes with cement fillings. This paste is anodyne and antiseptic, and a pulp will usually remain comfortable under it. It should be protected by a filling of gutta-percha or cement. If a pulp has begun to suppurate, this paste sealed in with soft gutta-percha is an excellent means of keeping the tooth comfortable while the pulp is dying. It may be left in under these conditions for a week or two, as the case indicates, and on its removal the canals can ordinarily be cleaned and filled with safety. It will usually be found that when a pulp has once become exposed in a deciduous tooth it is only a matter of time when it will die. These pulps do not seem to be very tenacious of life, and it does not require an application of arsenic to kill them. They will often die even under this antiseptic paste, but when protected in this way they seldom give the slightest discomfort while dying, and the tooth will often remain free from pain till it is shed. In other cases it may become somewhat sore following the death of the pulp, and even end in a small abscess opening on the gum; but there is never the intense suffering and excessive swelling which sometimes accompanies teeth that are neglected and left open to the fluids of the mouth.

Treatment of Abscessed Deciduous Teeth.

The canals should be as carefully cleaned as possible by mechanical means, and then packed with cotton saturated with oil of cloves. Some unvulcanized rubber sufficient in size to fill the cavity should then be forced down upon the cotton, and compression made on the rubber till the oil of cloves comes out the fistulous opening on the gum. When this is accomplished, if the preliminary cleansing has been thorough and the contents of the canals have not been too offensive, the tooth may be filled at the same sitting. If the dentin seems saturated with foul matter, the canals should be packed with cotton and oil of cloves and sealed with gutta-percha for a week. If the fistula still remains open at the end of that time, it should again be injected with oil of cloves and the tooth filled in the following way: The pulp-chamber and canals should be flooded with a solution of gutta-percha in eucalyptol, and some temporary stopping slightly warmed should be forced down into each canal till the eucalyptol solution shows at the opening of the fistula. The temporary stopping should be left in the canals as a root-filling, and the cavity proper may then be filled with whatever material is indicated.

Following this treatment, these cases will almost invariably heal and give no further trouble. Indeed, the management of abscessed deciduous teeth is usually a matter of not much difficulty, provided the patient is at all tractable and there is enough of the tooth left to work upon.

The Management of Permanent Teeth in Childhood.

This is one of the most important problems in the entire practice of dentistry. Decay of the teeth has been called essentially a disease of youth, and it is undoubtedly true that during childhood it seems to make its fiercest attacks. The teeth to suffer most from its ravages are accordingly among those which erupt earliest, and of these may be mentioned particularly the first permanent molars. These teeth should be the object of especial care on the part of the dentist. Beyond the fact that they are called upon to do longer service in the mouth than any of the other teeth, they have an important function in the dental arch which is not often carefully enough considered by practitioners. This relates to the time of their eruption and to the position they occupy in the arch. To them it is given to be the standard-bearers of the jaws during that period which intervenes between the loss of the deciduous molars and the growth to full length of the bicuspids and second permanent molars. Without the first permanent molars in their proper position at this time the jaws are allowed to drop too close together, so that the upper incisors overlap the lower incisors more than is normal, and the bicuspids and second molars are never allowed to assume their true length and position. This matter of maintaining the jaws in their proper relation one to the other is very important, as it relates to the symmetry of the face and to the most perfect mastication, and every effort should therefore be made to preserve the first permanent molars in their normal length. These teeth should be watched from the time of their eruption, and on the slightest approach of caries they should be carefully filled. In case the patient fails to apply to the dentist till decay has so involved the teeth that they are badly broken down and not capable of maintaining the jaws in their correct position, every effort should be made to so build them up with fillings that this function be not lost, and, failing in this, they should be crowned even at this early age rather than yield them up to the forceps.

The choice of materials to be used for filling these teeth in the early history of their eruption must be governed largely by the ability and disposition of the patient to withstand dental operations. If decay occurs on the occlusal surface during the period of the tooth's eruption through the gum, as is sometimes the case, the most serviceable material to check the disease at this time is usually cement. It may be employed with less thorough preparation of the cavity than is demanded for metal fillings, and it will prove effective as a temporary expedient to tide the tooth over this critical period till it is fully erupted and in a condition to receive a more permanent operation.

This material may be used in the very earliest stages of decay, even when the flap of gum has not entirely receded from the occlusal surface; and in some mouths where the tendency to decay seems to be very great it is well to use it as a preventive by forcing it into the grooves and sulci of the occlusal surface before actual decay has begun.

This will often so protect the surface during the eruptive period that decay will be avoided. When the occlusal surfaces of the teeth of the two jaws so approach each other that they are subjected to the friction of mastication the tendency to decay is thereby materially lessened, and it is consequently a matter of much moment to prevent decay till this takes place. The cement may conveniently be forced to position by the finger of the operator, as was advocated in the treatment of deciduous teeth, and considerable pressure may be brought to bear upon the filling-material, so that every indentation on the occlusal surface is perfectly filled. This, while it may not be considered a very elegant method of operating, is assuredly a most effective one, and in this instance utility is paramount to elegance.

In cases where occlusal cavities have been filled in this way with cement the teeth should be examined every three or four months, and metal fillings inserted as soon as the cement wears away and the conditions in the mouth make it possible to do more permanent work. These conditions relate to expediency of operation and to the increasing fortitude on the part of the patient to withstand the tedium and pain necessary, rather than to any pronounced change of structure in the teeth. That a change does take place progressively from youth to age is without question, but it is neither so radical nor so rapid that it need be accounted an important factor in the selection of a filling-material. Dr. Black has shown conclusively that all enamel and all dentin is harder at any age than any of our filling-materials, and this should be sufficient to settle the question so far as it has a bearing on the choice of material. If tooth-tissue is found which is softer than the materials we use it is due to pathological conditions aside from dental caries, and need not be considered in this connection.

As to the choice between gold and amalgam, this should be governed by two considerations,—the one of expense and the one of an adequate endurance on the part of the patient to submit to gold operations without undue nervous strain. It should be the aim of all operators who take pride in their work, and who wish to do the most permanent service, when they have the care of the teeth from childhood, to keep amalgam out of the mouth entirely, but this does not seem in all cases to be possible. We must not jeopardize the nervous system of our young patients in the blind effort to live up to some high ideal, no matter how beautiful it may appear to us. Neither will it do to affirm that gold should never be used under a certain age, say the age of twelve, as we have so often heard. It is not a question of age at all. It is a question of temperament, a question of physical and mental stamina on the part of the patient. Some children at a given age have double the capacity for enduring operations upon the teeth that have other children at the same age, and every operator should make a careful study of this matter among his patients.

A very useful material for filling these occlusal cavities where the area of the cavity is not too great is a combination of gold foil and tin foil rolled together. This can be used when the gold operation would be too exhausting, and if properly manipulated it will prove a very satisfactory and often a very permanent operation. With an operator who is familiar with its manipulation it may be inserted so rapidly that it is seldom necessary to apply the rubber-dam, and this of itself is often an important item in the management of children's teeth. It is especially indicated in occlusal cavities of upper molars and bicuspids, the lower molars ordinarily calling for fillings too great in area to make this material serviceable. It cannot be depended upon to wear well in cavities with a broad masticating surface.

There is one point upon first permanent molars which calls for the most careful attention in the early period of their eruption,—viz, the mesial surface. This surface is in contact with the second deciduous molar for several years before the loss of the deciduous teeth, and if the tendency to decay is great in that mouth, or if the deciduous molar is affected on its distal surface, the first permanent molar is almost certain to suffer. It is well in many of these cases, as soon as the permanent tooth is fully erupted, to grind away the distal surface of the deciduous tooth so that there is only a narrow contact between the two. In this way the mesial surface of the permanent molar is more readily kept clean.

In case decay occurs on this surface, it may ordinarily best be controlled during the presence of the deciduous teeth with gutta-percha. If a sufficient depth of cavity cannot be gained to secure the gutta-percha to place, it is best to flow cement over the surface as a temporary expedient, though cement on these approximal surfaces must not be depended upon for any length of service. The patient should be instructed to report immediately on the loss of the deciduous molar, and whether the permanent tooth has been filled with cement or gutta-percha it should at that time be replaced with gold. This can be done to better advantage before the eruption of the second bicuspid, when the mesial surface of the permanent molar is freely presented to the operator, than at any time subsequently. At this sitting every vestige of affected enamel should be included in the cavity, and the metallic surface be made sufficiently broad to render the operation as permanent as possible.

In cases where the approximal surface is so decayed that the occlusal surface becomes involved before the operator's attention is called to it, the best temporary filling is ordinarily to be found in a combination of gutta-percha and cement, laying gutta-percha over the cervical third of the cavity and completing the filling with cement. The latter will probably require occasional renewal, but the gutta-percha will ordinarily last till the patient is in a condition to have gold inserted.

The care of permanent incisors in the mouths of children is a matter calling for careful consideration. If decay occurs very early, it is usually best to resort to cement or gutta-percha, instead of attempting permanent work at the outset. The choice between gutta-percha and cement must be governed by the nature of the decay. If there is sufficient penetration to securely hold the gutta-percha in place, it may be depended on for more permanent work than cement, but in shallow cavities, too sensitive for much cutting, the cement may be maintained in place more readily than gutta-percha. Neither of these materials need be considered in the light of anything but temporary expedients, and the patient should be carefully studied and judiciously schooled toward an attitude of sufficient fortitude to submit to gold operations as early as may seem practicable. The date at which gold may be substituted for the other materials must depend on the sensitiveness of the teeth and the ability of the patient to submit to thorough work without too much nervous tax. It is folly to attempt to insert gold while the patient is so illy under control that perfect work is impossible, as it is also wrong to defer longer than necessary the insertion of a reliable material like gold and leave the teeth to the mercy of materials long since proved to lack permanence.

SOME PHASES OF THE CEMENT QUESTION.

BY W. V-B. AMES, D.D.S., CHICAGO, ILL.

(Read before the National Dental Association, August 1, 1899.)

I MUST at the very beginning pay tribute to the men who, by systematizing the use of such physical apparatus as the micrometer, dynamometer, and microscope, in the examination of the physical properties of filling-materials, have made it possible for me to present what is to follow.

In the consideration of the physical properties of filling-materials by various investigators, the time seems to have come for the cements to receive their share of attention. I feel justified in saying that the first really unprejudiced investigation of any moment of the physical properties of cements was begun by Dr. Wedelstaedt not more than a year since, and the publication of only a small portion of his results has awakened the profession to a realization of greater possibilities in this field.

I propose to treat as briefly as practicable the questions of crystallization of cement liquids, coarse *versus* fine powders, shrinkage and expansion of cements in wet and dry states, and the question of arsenical contamination of cement powders.

The crystallization of liquids has been the "bugbear" of cement manufacturers, especially of those who have striven to rise above the stereotyped glacial phosphoric acid product. With a liquid of that kind,—*i.e.*, one in which the phosphoric acid has been modified by sodium phosphate,—only the best results possible in the material can be achieved with a solution of a specific gravity which will insure absence of crystals in all climates and seasons, whereas if the phosphate of some metal other than of the alkaline group be used the problem of avoiding the crystallization of the liquid immediately enters.

With this variety of liquid we almost invariably find crystals separating, which will be either in suspension, loosely settled at the bottom of the bottle, or adhering firmly to the bottom and sides of the container. While we have all no doubt had the conviction that a bottle of cement liquid in which there has been a separation of crystals was not up to its highest standard, this condition is often overlooked and the clear portion used, leaving the crystallized portion as waste. Now, in all such cases the material represented by the crystals was once in solution, and was intended by the manufacturer to be evenly distributed throughout during its consumption; so in the use of only the clear portion the virtues of the original formula are to an extent lost.

Several efforts have been made to convert the solution into a pasty mass, which can be worked either with or without liquefaction by heat. Those needing liquefaction have been sparingly used, I think, because of their virtues not being commensurate with the annoyance; and those which work without liquefaction I have not found to possess any startling virtues. I do believe, however, that we will come to look for our best cements among those which are given to forming crystals during midwinter, and if we will take the pains to distribute the crystals so as to use them uniformly, or liquefy them by heat, if the manufacturer so directs, we will not be called on to state that the package worked well until crystals began to form, and it was then worthless; for these crystals, unless they be of the hard, glassy variety, of the alkaline phosphates, will rub down and liquefy in the mix of the cement.

Coarse *vs.* Fine Powders.

A matter of minor importance, comparatively, is the degree of fineness to which cement powders shall be reduced. While we are almost under the necessity of having it reduced to an impalpable state, in order to use it to advantage for the purposes for which it is intended, it is yet a matter of interest that in dynamometer tests of masses made up from powders of different degrees of fineness there is an increase of edge strength up to a point somewhat short of impalpability, and then a dropping off with the powder which has been reduced to what may practically be called an impalpable state.

The practical conclusion would be that if we are more interested in the strength of a contour, we can expect greater satisfaction with a powder in which a slight grit is discoverable. At the same time it seems thoroughly reasonable that this particular granular state will detract to some extent from the ability of a mass to withstand long-continued attrition as compared to one made from a nearly impalpable powder. This may need clinical demonstration.

As Dr. Wedelstaedt states, the powders of one cement can often be used to advantage with the liquid of another, and, as much powder is sent out much too coarse for inlay setting, we are apt to have some at hand suitable for contours.

Shrinkage and Expansion.

It seems advisable to consider the question of shrinkage and expansion of oxyphosphates, for fear that experiments which may have been begun and not carried to a proper conclusion may be reported and give an erroneous impression of the significance of shrinkages which take place under some conditions. In the two classes of cements to which reference has been made, there is a distinct and radical difference in the amount of shrinkage when allowed to harden in a dry state. When the crystallization has taken place with the mass subjected to water, there is an interesting modification of this shrinkage (which is often changed to an expansion) among those containing non-alkaline phosphates.

In the oxyphosphates wherein the phosphoric acid has been modified by alkaline phosphates only, the basic phosphate which is formed, and which accounts for the hardening of the mass, is of a friable nature, and is of itself a porous material; so that in agglomerating the crystals or granules of zinc oxid it exerts no special force which would result in a drawing together of the granules and make evident a shrinkage at the periphery.

In the oxyphosphates wherein the acid has been modified by *non*-alkaline phosphates the basic phosphate formed has a glassy nature, and not only agglomerates, but agglutinates the zinc oxid granules. In the previous case the basic phosphate itself becomes porous in its crystallization, while in the second case it is, as stated, a glassy material which agglutinates the granules to such an extent as to cause a drawing of them toward a center, if the composition happens to give a tendency to a diminution of volume during the crystallization. This diminution of volume sometimes depends on a lack of water of crystallization, which if present in the composition would give too rapid setting, but which if added to the crystallization or hardening mass will be taken up and give the difference between a shrinkage and zero or an expansion.

In the first class there is a diminution of volume which is not apparent, in a sense, because there is formed a porous material. There is shrinkage toward an infinite number of centers instead of one, as in the second class. In the second class I must reiterate; there may be diminution of volume in a dry state and zero or expansion by furnishing extra water of crystallization, so, as said, it seems desirable to call attention to these differences in behavior to offset the erroneous estimate which might be placed on the report of a shrinkage of cement as measured by a micrometer and observed under a microscope, if this mass has been allowed to harden in its tube in the dry state, wholly unlike conditions presented with use in the mouth.

A practical hint from these observations would be the abandonment of the idea that cement fillings of all classes of material are benefited by being kept dry for an indefinite period. It appears rather that in the use of materials of this second class, which have decided hydraulic properties, there is a disadvantage rather than an advantage in long-continued protection from the saliva.

Arsenical Contamination.

There has been an agitation again recently of the easily demonstrable arsenical contamination of cement powders. To most practitioners whose observation has extended over ten years or more this is not an especially interesting problem, since the material has been used by them to an extent which would preclude any potency of the arsenic compound. That the inert zinc arsenic compound might not under some unpardonable conditions be changed into potent arsenious acid I will not claim, but I have proven to my own satisfaction that the arsenic present is in combination with the zinc, and that this combination is wholly devoid of poisonous properties *per se;* and that the combination is not broken up to the extent of forming potent arsenious acid except under rare and unjustified conditions.

As a general proposition the presence of an arsenic compound in cement powder cannot easily be pronounced advantageous, but since the process involved in assuring a product absolutely free of arsenic would assure a faint trace of the alkaline precipitant, which would detract from the integrity of a mix, I would say that the arsenical contamination is the lesser of the two evils. I feel that if results obtained by myself and others are verified by prospective repetitions, the infinitesimal arsenical contamination may be ignored.

For experiments in this direction there was prepared a compound of arsenic and zinc containing the maximum proportion of arsenic. This was gotten by heating in a sealed tube certain proportions of zinc oxid and arsenious oxid. In confinement a full red heat will effect a thorough combination of the maximum amount of arsenic with the zinc, which seems to be about seven per cent. This is sufficient to give an extensive mirror with the Marsh test.

This combination at a full red heat is such that three thousand degrees Fahrenheit can afterward be applied to the compound in an open crucible without affecting the decomposition.

This is necessarily the compound which is formed in infinitesimal quantities in the manufacture of cement powder. The consensus of opinion of expert chemists consulted is that there is formed a basic arsenite of zinc. Portions of this compound have been furnished to numerous *confrères* for experimental purposes. In my own practice its potency has been tested as favorable cases have been presented, which unfortunately do not present themselves in profusion just when wanted.

In my own tests I have been totally unable to bring about the death of a tooth-pulp by placing in reasonably close proximity a liberal portion of this zinc arsenite. One case in detail, for illustration, will answer. An upper cuspid and a second bicuspid were to be excised in the course of time in preparation for a bridge. There being no necessity for haste, and the patient being in sympathy with the experiment, the two teeth were drilled to a considerable depth, vitality being plainly evident. A liberal portion of arsenite was then inclosed. After three weeks the cavities were opened and the sensitiveness found just as much in evidence as previously. Cataphoresis was then used on the cuspid to the extent of enabling the uncovering of the pulp, which on exposure presented all of the appearances of normal vitality. Arsenious acid was then applied and devitalization effected, as would be expected. This is typical.

The zinc arsenite has been sealed in teeth wherein the pulp might be spared for ten days without decreasing the sensibility, and fillings inserted. A case of actual exposure, with hemorrhage, was dressed with the arsenite and left ten days, when the blood-clot was removed and a pulp stump found nicely healed.

CEMENTS.

BY DR. E. K. WEDELSTAEDT, ST. PAUL, MINN.

(Read before the National Dental Association, August 1, 1899)

Mr. President and Gentlemen: Dr. Ames, of Chicago, has a paper on cement, and, as we have done a trifling amount of work together along this line, I have left the scientific side to be taken care of by him. It is not necessary for two of us to cover the same field. The substance of my paper, therefore, will be simply to call your attention to a few things that I feel are not generally known.

Dr. Black informs me that cements have been in use by the members of the dental profession for the past thirty years. Investigations into the physical properties of filling-materials have been going on for about this same length of time. It therefore seems strange to me that it fell to my lot to discover that the majority of cements in use could very readily be penetrated by moisture. Among the thirty-odd cements which were tested I found only one that the moisture would not penetrate from circumference to center. The attention of some of the manufacturers was called to this state of affairs, and I believe just one at once improved his product and sent me a cement that moisture could not penetrate. For thirty years we have been using cements that the moisture could readily penetrate. It can well be asked, "Why agitate this matter now? Has harm been done through their use, or not?" Personally I feel much harm has and does result from using any filling-material that the moisture can penetrate.

I will be frank and state my position in coming before you with a short paper on this subject. I wish the assistance of every man who has the welfare and the progress of the dental profession at heart. It is very true one man can do much, but the combined efforts of many can do a great deal more. If each man will, the next time he has occasion to use any cement, mix a trifle more than he wishes to use, and then place this residue in a bottle of ink for a given number of hours, say twenty-four or forty-eight, he can readily ascertain after removing the mass from the ink and breaking the filling the extent of the penetration of moisture. If there is not any penetration, that cement, in that particular at least, is a good one to stick to. If the ink has penetrated that cement from circumference to center, he can be very certain that the saliva will penetrate it; and when the saliva can penetrate, the micro-organisms can penetrate also.

The question for you to decide is this, Do you wish to continue to use cements of this kind?

Here are some sample fillings of a certain cement, and I think on breaking the mass you can clearly see the anilin in the center of it. The tubes in which these fillings were made are somewhat over thirty-five millimeters in length. It is a very difficult matter to make anything like perfect fillings in them. Thirty drops of fluid are dropped on the slab, and about half a teaspoonful of powder is placed beside it. The quickest way for anybody to ascertain how difficult it is to mix so large a mass of cement is to try it.

After the cement had been mixed it was removed from the slab and transferred to the palm of my hand, where it was rolled. (Each mass of cement mixed received the same amount of rolling.) The mass as it leaves my hands is between one hundred and two hundred millimeters in length by from three to six millimeters in diameter. It is then handed to the assistant, who cuts it into short pieces and places piece after piece in the tube as required. About eight or ten pieces are necessary to make one of the large fillings. The packing of the cement is accomplished only after considerable difficulty, and the filling that is finally made is, as a rule, very unsatisfactory. After the cement has been packed into the tube it is let alone until it has fully set. On several occasions on attempting to remove the fillings from the tube, fractures or partial fractures have taken place. These can be seen on some of these fillings.

I desire to say that these are not the only experiments that have been made with this cement; many others were made to ascertain all I could about it before these large fillings were made. The results of all the experiments were most unsatisfactory. The small fillings that were made and tested gave me the same results as did the large ones. The tubes in which these fillings were made have alboline applied prior to having the cement fillings made in them. After the fillings have been removed from the tubes they are not washed in ether or alcohol to remove any traces of the alboline. I call attention to this for the reason that in my published accounts of former experiments made with cements the fillings were always washed in ether and alcohol before they were placed in the bath. Accidentally I dropped one of these sample fillings into the anilin solution without washing it, and I was very greatly surprised later on when I removed it to find that it did not make any difference in preventing moisture from penetrating. I at once made another series of fillings. On removing each filling from the tube it was dropped into a bottle containing sandarac varnish. It was left there a few moments, and then removed and placed in this bottle of water, in which some pieces of red anilin had been previously dissolved. Still I was not satisfied.

Another series of fillings was made, and after they were removed from the tubes they were rolled in some melted paraffin and then placed in this bottle. These fillings were made on the 12th of July, and they have been in these bottles since that time. I do not know what their condition is. I leave this for you to ascertain. I have, however, my own opinion in regard to their condition. I will hand these bottles to Dr. Johnson, who will open the discussion of this paper, and let him make the first examination. All these sample cement fillings have been made from the same package of cement. The strength of the anilin in these three bottles is the same. This was obtained in this way: A few grains of anilin were placed in one of these bottles when it was empty. This was dissolved in a little alcohol and water, and then the bottle filled with water drawn from the hydrant. This was then well shaken and divided into thirds, as you see it here before you. I ask that you make a careful examination of these fillings, and if you are dissatisfied with the results I have obtained you can very easily make similar experiments. You can thus verify the results to which your attention has been called. The experiments are so simple that anybody who has an interest in this matter can very readily make them for himself. These fillings are seven millimeters in diameter by twenty-five millimeters in length, and the results of my experiments show that it takes somewhat less than seventy-two hours for the anilin to be found in the center of this large mass. It would therefore be a much shorter period of time for the moisture to penetrate smaller bodies of this particular cement. Some very large fillings of similar oxyphosphates show complete penetration by the moisture within twenty-four hours.

The penetrability of moisture into our cements is but one of three evils that we are compelled to deal with at the present time in regard to cements. The other two are contraction and expansion of the mass after it has been mixed. I was somewhat surprised to find some of my experimental fillings would expand two millimeters beyond the cavity in which they were made. I have been equally surprised to find shrinkage in some cement fillings when made in cavities in green teeth and tested in moisture. The anilin has run completely around the filling, leaving the axial wall of the cavity as well marked as though no cement filling had been placed in that cavity.

I do not think we as a class, knowing these to be facts, desire to use filling-materials of this kind.

The woeful lack of knowledge in regard to this subject is most apparent, if one is to judge from the statements of others. For example, Dr. First says, "I varnish all my cement fillings, and therefore I am not afraid that moisture will ever penetrate them." Dr. Second says, "I cover all my cement fillings with hot paraffin, therefore the moisture cannot penetrate." Both these good men seem to overlook one point, and that is that the varnish and paraffin simply protect the filling for a short time; and if it is one of the expanders, a crack is made which allows the saliva to creep in at once. Dr. Third can do the following with one of our well-known cements which is a bad leaker: He can mix it by one method of manipulation so that it will be moisture-proof, and by another so that the moisture will penetrate it. He can take that which was mixed to be moisture-proof, and by using certain principles of instrumentation can pack it into a cavity so that the moisture will penetrate it. He can also take that mix that was not moisture-proof, and by using different principles of instrumentation can pack it so that the moisture will not penetrate it. These allegations are theories without any foundation. A cement that leaks, leaks; one that contracts, contracts, and one that expands, expands. Instrumentation and manipulation have more or less to do with the two last, but when it comes to the penetration of moisture I desire to say this: I have tried over one hundred different methods of manipulating cements, and a leaker would always leak. Every known principle of instrumentation that has been brought to my notice has been tried in packing these leaking cements, but still the moisture would penetrate as readily as before. That different methods of manipulation and different principles of instrumentation *do* influence the strength of the cement seems unnecessary for me to say, but they have no effect whatever on the ingress of moisture. On the contrary, a cement that does not leak, does not leak. It does not make any difference how thin it is mixed, so that it can be handled; and it does not make any difference if it is mixed to the consistence of putty, the moisture never creeps in. And, again, for years I have used X's cement. It is not moisture-proof, but it is a most excellent cement, just the same; and I like to work it. But it is not to be relied on, so something else must be tried. I have in the office some of Y's cement. I do not like it, but it is moisture-proof. I obtain a moisture-proof filling by mixing the powder from X's with the fluid from Y's, and in this way better results are obtained than if either the X or Y cement had been used by itself. For this reason the X cement is perhaps the best we have, so far as this relates to standing much wear and tear. The Y cement is not so good. Uniting these two seemed to produce the best results that I have so far been able to obtain. This is something new, and it is of importance to us at present, especially as this matter is so far from being settled.

There seem to be erroneous ideas prevalent in regard to the oxychlorids. It has been stated to me that the moisture would not penetrate the oxychlorids the same as it would the oxyphosphates. This is a mistake. Moisture does penetrate one the same as the other. I do not think it is possible to find an oxyphosphate that will take the place of an oxychlorid; in fact, I do not believe there will ever be an oxyphosphate made that will equal Justi's Acme. When this is properly mixed and packed into a cavity and there left for three or four days, I am perfectly frank when I say that I much prefer to cut dentin at any time than this hard, granite-like substance. (I desire to beg pardon of the gentlemen of this society, for I agreed not to use the names of any cements.) So that there may not be a misunderstanding, I desire to say right now that my experience with this hard, dense, and strong oxychlorid has been most unsatisfactory when it has been used as a temporary filling. But for use as an intermediate layer or as a foundation in pulpless teeth only, I have never found its equal in any cement. Moisture does not penetrate this oxychlorid, but it has penetrated the other oxychlorids as readily as it has the oxyphosphates. Oxychlorids are of particular use to us in all pulpless teeth, and I think they are far better to use than oxyphosphates. They have been long neglected, and I think good use of them can be made by the members of the dental profession.

For somewhat over twelve months I have been studying cement experimental fillings microscopically. (It might be well if others would also do a little work along this line.) These examinations have revealed many things about cements. I have been very greatly surprised to find bits of wood, hair, cotton, broom straws, and much dirt in the center of many of the cement experimental fillings. Certainly, there is some carelessness shown by some of the manufacturers' employes. These things should not be found in our cements.

For the past week or two I have been studying terra-cotta, bricks, stone, etc., and making a comparison with my cement fillings. I find terra-cotta and the rest correspond very closely to the cement fillings, so far as this relates to the air-bubbles I find in the different things examined. I do not know where these air-bubbles come from, nor can I account for them. They are not so prevalent in the oxychlorids as in the oxyphosphates. This can perhaps be readily explained, as the liquid of the oxychlorids is like so much water, and it readily absorbs the powder with which it is mixed. A more perfect union is thus obtained. With the oxyphosphates we have a heavy syrup-like fluid, which is not so readily mixed with the powder. I do not know that these air-bubbles do any harm, but I felt it was well to call your attention to the fact of their existence.

It is necessary to call your attention also to one very important fact about cement fillings, oxychlorids as well as oxyphosphates, and that is the effect that age has on them. From one mass of mixed cement let us make six experimental fillings in the cavity block. The fillings will be cylinders two and a half by three and a half millimeters. Each filling will be made of three pieces of cement, and each piece of cement will receive three blows from the automatic mallet. The packing instrument will be a smooth-faced bayonet plugger that is three millimeters in diameter. These fillings will be placed in three boxes. The first and last made filling will be placed in one box, the second and fifth in another box, and the third and fourth in another box. The boxes will be numbered one, two, and three. At the end of twenty-four hours the two fillings in box No. 1 will be tested. A filling will be placed in the dynamometer and the pressure turned on. As a rule when eighty pounds is reached the filling goes to pieces. The second filling is then placed in the dynamometer. When seventy-five, eighty-five, or ninety pounds is reached the second filling will go to pieces. At the end of forty-eight hours the fillings in box No. 2 are tested, and it may surprise you a trifle, but it is not an uncommon thing to have these small cylinders carry two hundred pounds before going to pieces. When seventy-two hours have passed the fillings in box No. 3 are tested, and it would not surprise me in the least to have them carry three hundred and fifty or four hundred pounds before they would crush. In reality, I have one cement in my office at the present time from which fillings were made by this method that carried but thirty or thirty-five pounds of stress when they were tested at the end of twenty-four hours, whose mates, fillings made from the same mass and mix and at the same time, all made as nearly alike as possible, carried upward of four hundred pounds of stress before they crushed when tested at the end of ninety-six hours. Now, I do not know whether this is of that importance and value to you that it is to me, but I no longer place metal fillings on freshly made cement. If there is going to be contraction or if there is going to be expansion of the cement placed in any cavity, I wish it to take place before the metal filling is made.

In conversation with my friend, Dr. Lehnen (the well-known chemist), he informed me that the trouble we had with cements was largely due to our not knowing how to mix them properly. He alleges that there is a certain point that makes a homogeneous mass, and the moment we pass this point we weaken our cement. If the cement is insufficiently mixed it is also weakened. I at once took cement, spatula, and slab to Dr. Lehnen, and asked for a practical demonstration of what constituted a homogeneous mass. He gave it me. I returned to my office and at once made some experiments with the cements I was then using, and, to my utter dismay, I desire to say that the difference in the penetrability of moisture could be detected without any trouble. Can I hear some one ask, "How was this possible?" I will cheerfully explain it. Dr. Lehnen's homogeneous mass was somewhat different from that which I thought constituted it. I at once mixed from the same package a mass of cement on the slab. "That is a homogeneous mass, according to Dr. Lehnen," I said. A piece about seven millimeters in diameter was laid to one side and a dent made in its center. More powder was then added to the mix, and the spatula well used on it. A ball about the same size as the first was taken from this mix and two dents placed in it. More powder was then mixed with the mass and the third ball made. These were left to harden for about fifteen minutes on the slab. All were then placed in the same anilin solution and left there for twenty-four hours. At the end of this time they were removed, washed, dried, and examined; and, gentlemen, I very much regret to say it, but the one called a homogeneous mass showed the least penetrability. The one with two dents showed much more penetration than the one with one dent. The one with three dents was penetrated to its center, while the one with the one dent showed that it had been penetrated only to about one-quarter way to its center. I should like to show you what Dr. Lehnen showed me as a homogeneous mass, but I do not know how I can do it.

It is said there are eighty thousand dentists in this world. If each used but one ounce of cement a year it would amount to about five thousand pounds. I think forty-five hundred pounds of this would, on account of what I have mentioned, be unfit to place in the cavities of the human teeth. The sooner that we are rid of cements that contract, that expand, and those which moisture can readily penetrate the better it will be for us, our patients, and the manufacturers. I believe the last will be the first to improve their wares after they find we will not buy nor use cements of this kind. Just so long, however, as we continue to buy them, just so long will they be manufactured. As soon as we create a demand for a better article we shall have it. It was a very short time after I created a demand for a better cement that I received it. It lies in your power to create this demand. I have called your attention to the necessity for it, and I feel there is little call to do more, for I feel certain with this knowledge before you sufficient interest will be aroused to have at least individual, if not concerted, action.

I desire to acknowledge my indebtedness to Drs. G. V. Black,

C. N. Johnson, and W. V-B. Ames for many valuable suggestions that have been made to me in regard to this work. Dr. Ames and Mr. John F. Hammond have furnished me with many samples of cement. The former, in particular, has at all times not alone been anxious, but most willing, to assist me in every way possible in this investigation. Without Dr. Ames's assistance it would, beyond a question, have been many years before as much knowledge would have been gained in regard to this subject. He has been an indefatigable worker, and has given me much assistance.

I trust, gentlemen, that at the next meeting of this society much more will be known about cements. I desire to thank you for your attention, and hope that great and lasting good may be the outcome of your labors.

SOME OF OUR MISTAKES ABOUT PERIODONTAL DISEASES.

BY HENRY S. NASH, D.D.S., NEW YORK, N. Y.

(Read before the New York Odontological Society, May 16, 1899.)

I REGRET that my appearance before you this evening is to be in the character of a critic, but I am sure you will attribute proper motives to me; and I shall take all the pains possible to justify you in doing so.

Since we all make mistakes of some kind, it can hardly be that any of my good-natured friends will take exception to having his attention called to some quite serious ones which we as a profession are daily perpetrating in speaking of the various diseases that terminate in the loosening and eruption of the teeth. These errors are certainly subjecting us to unfavorable comment. Even the profession itself is not satisfied with the names that have been bestowed upon the diseases in question, as their irrelevance and incongruity become more and more manifest to us. It is high time, therefore, that these things should be seriously considered by us, for that which is now merely unfavorable comment may soon change into something still less endurable.

It is not always a pleasant thing to do to change our minds, especially in respect to those opinions to the advocacy of which we have committed ourselves publicly; but when the evidence is clearly against us, this, I am sure you will agree with me in saying, is the only proper, manly course to pursue. It may hurt a certain kind of dignity, but it does contribute greatly in enhancing the growth of a very much better sort, one that helps us to respect ourselves.

An important service has recently been done for us by Dr. J. Leon Williams, of London, England. I am sure that none of us who had the pleasure of listening to those brilliant addresses of his, which were read at your anniversary meeting last January, will ever forget them. We would be neglectful of a solemn duty if we fail to profit by them. The afternoon lecture was on the bacteriology of the mouth. It was a summary of the results of his own researches in this field, and contained conclusions of an extremely important character. The evening address was a timely and urgent appeal to us to take some steps toward advancing the status of our profession as a scientific one.

I am heartily in accord with the recommendations that were contained in this appeal. The action of the chairman of your Executive Committee in immediately starting a plan to carry them out was most commendable. I decided at once to contribute my mite for the furtherance of this object whenever opportunity offered.

Now, my friends, I have to ask your indulgence just a moment longer before speaking of our mistakes regarding these alveolar diseases, for the purpose of saying to you that they have been made the subjects of the most critical investigation of which my time and health have admitted for a period of about twenty years. This was for a considerable portion of the time in collaboration with one of the most distinguished physicians and surgeons his profession has ever contained. At the time alluded to he was, and had been for many years, the dean of the Bellevue Hospital College, of this city. The report of the results of all this labor will be offered to you very shortly in the shape of two small volumes, the first one of which is now in process of publication by F. Schleuning, of Stuyvesant Square, this city.

It will perhaps be conceded that, with the resources afforded me by Bellevue Hospital and College, by the practices of the dean referred to, Dr. Frank H. Hamilton, and a number of his friends, as well as those of several of our own busiest practitioners, my advantages for conducting this investigation were of a very unusual character.

I had been desirous to retain and utilize the names which had already been given to periodontal diseases, but a critical examination of them rendered this quite impossible, except in regard to some of the individual types, like "calcic pericementitis."

To give a specific name to a pathological condition is a very venturesome thing for those of us to undertake to whom anatomy, pathology, and general physiological functioning are not much better understood than is at all possible if our information concerning these sciences is confined to the course of instruction afforded by our dental colleges. Even if we have mastered these collateral branches of study, we must still remain in close touch with the advancement now being so rapidly made by our allied professions, or mistakes may still occur. We do the best we can in this direction when, presto! some quite new pathogenetic agency comes before us, when we may find that we have been committing ourselves publicly to a course with which it is not concordant. This is a case where the open hand of charity should be generously extended, for who can claim that at the time when the error was made he could have done any better himself? Surely no one would make *such* a claim, although our profession contains some pretty healthy claimers.

In consideration of the obscurity of the origins of these alveolar diseases, it is less singular that we should have erred respecting their etiology than that we have given inappropriate names to them, for in this latter particular we have their clinical aspects to aid us.

All those by which teeth are lost simply by the resolution of the periodontal tissues commence their attacks upon the marginal portion of the pericementum. The pathological state at first is a pericementitis, but it soon becomes an alveolitis as well. The latter being a universal symptom among the dozen or more disorders from which loosening occurs, while pericementitis is not, it seems advisable to speak of the entire group generically as "alveolitis," confining the use of such terms as those which represent solely some prominent clinical feature to those of its subdivisions for which it may be employed in a distinctive sense.

One of the types of "pericementitis" is due entirely, as an exciting cause, to tartar that has been forced between the roots and the gums in mastication. Another is due to superficial tartar; still another to an interstitial abscess commencing on the alveolar side of the marginal portion of the pericementum, and these are the only ones among the dozen types of alveolitis where pericementitis is the most distinctive clinical feature. There are, of course, other exciting and predisposing causes. It is unnecessary to speak of these here, but an *alleged* one should be noted at some length, for it is mistakenly considered as an actual accomplice by many of our really intelligent and representative members. This is gout.

"Serumal concretions," or tophi, which is their proper designation in pathology, are being said to form upon the roots of teeth as the result of the presence of the gouty diathesis.

In order to arrive at a really satisfactory and conclusive decision about this question we would have to be much better acquainted with the manner in which tophi are formed than a dental surgeon, or even a physician of no more than ordinary attainments, could be expected to be. Were we fully posted in this respect, and with the anatomy of the parts involved,—and medical literature affords us ample opportunity of becoming so,—we would quickly realize that the occurrence of a tophus on the root of a tooth would be, in every sense of the word, an utter impossibility. The differences between the morphology, the color, the density, the growth, and proportions of the chemical constituents of a tophus and the concretions on a root are of so radical a nature as to render it unaccountable how the two could ever have been mistaken for each other. The surface of a tophus is smooth, and never incites a pyorrhea; the root concretions are rough, and invariably tend to do so. The contour of the former is of a uniform character, that of the latter never so. The former is thick, the latter thin. The former is nearly white, the latter sometimes so and often almost black. The former is much too hard and dense to be smashed with an instrument, the latter is easily crushed. The former cannot be scraped from the bone on which it forms, the latter is removed by us all in this manner nearly every day. The growth of the former is invariably spasmodic whenever it occurs at all, which is very seldom; the latter are always adding to their bulk or losing it from dissolution in the pus surrounding them. The former are always composed largely of uric acid crystals; the latter never have any at all, unless they are so situated as to cause the rupture of capillaries in mastication, and even then to an infinitely minute extent. Now, will any reasonable and well-informed person tell me *why* we hear so much about gout and serumal deposits on teeth? While he is about it, will he tell me also why in the world it is that we form theories upon any but fundamental, basal facts when such facts are so easily obtainable, as they are in this instance?

In confirmation of the statements above as to the radical differences between tartar and tophi, I will take the liberty of referring you to our medical encyclopedias and to any intelligent and experienced surgical clinician. But some of the reasons why serumal concretions can never be found on the roots of teeth are of such a sort that no medical literature can be expected to contain allusions to them, for no really scientific physician would waste his time over a matter which to him must bear the aspect of an absurdity already.

To those, therefore, who really hold to the theory that an exudation of serum can actually have force enough to rip the pericementum from a root, I suggest a consideration of the following facts:

Serous exudation, in its principal aspects, is like an ordinary hemorrhage, except that it is somewhat slower in taking place, because all the arterial coats are not ruptured. The exudation is, therefore, a filtration or exosmosis through the remaining tissues. This is comparatively quickly accomplished, however, probably not more than an hour being required for the accumulation of serum sufficient to form a tophus of ordinary size. The lesions are then permanently closed by a proliferation of fibrous tissue.

We have all extracted teeth, and are consequently well aware of the great strength of the attachment between the cementum and root. In fact, a slight wrench must be employed before this attachment can be broken, direct force being unavailing unless an almost superhuman effort is put forth. This is due to the arrangement of the connective-tissue fibers, which leave the cementum at a right angle with its surface and go in a straight line directly to the alveolus. Owing to this arrangement, also, a serumal exudation could come only *between* these fibers, not across them,—*i.e.,* also at a right angle to the face of the root. The tension upon the tough fibers would, therefore, be directly in the line of their greatest ability to resist rupture. It is absolutely inconceivable that any physiological force whatever, or any other short of that of a steam engine, could send the serum against the root with sufficient force to tear them away from it. Another fact which has escaped notice is that the amount of serum required for the formation of a tophus of even uncommonly small dimensions would consist of about two minims. Will any one tell me where the space necessary for its lodgment is to be found? Of course, the only direction in which the connective-tissue layers can take before rupturing is a lateral one. One of our respected members is strenuously advocating the opinion that these supposititious exudations invariably occur in the foraminal region. Were this true, the agony it would cause in the act of strangling the nerve and blood-vessels would be so intense that it must be left to the imagination for realization, for no description by pen or tongue could do it justice.

If it shall be held that there is a constant but minute exosmosis constantly going on, from which the concretion is gradually formed, aside from the fact that this would violate a well-known physiological law regarding ruptures, will any one tell me if he ever knew of cases where tophi grew gradually in dimension? Their growth, if by this term an increase in size is meant only, is always spasmodic, as was stated; it is impossible under ordinary circumstances for it to be otherwise. Did this occur on the root of a tooth no one will need to be told that the first exudation would as certainly be the last one as anything relating to human beings can ever turn out to be. No rational mortal would ever run the risk of having to endure a second effusion of this kind if he were not bound hand and foot during its inception and subsequent history.

While it is admitted by the advocates of the gouty theory that serumal exudations are found only among arthritic tissues, it is contended that the union of a root with the alveolus forms a joint. This is an error, the union being so self-evidently *not* a joint that a word was long ago coined to describe it. This word is "gomphosis"; it means, literally, a bolting together, the bolt being a very nearly solid mass of connective tissue.

A joint is something requiring lubrication. This is accomplished in the human system, as we all know, by synovial fluid. No such fluid is found around the roots of teeth, nor are there any neighboring glands which could furnish it; nor is there the remotest possible occasion for its use if it were to be furnished.

Chalky deposits may certainly be found where the serum does not exude at all. I have known of cases where the intima of blood-vessels was thickly coated with them. But unless they occur, or have remained some time in such places as the urinary passages,—*i.e.,* where their menstruum is quiescent and contains uric acid,—they are free from it. In the former case their principal chemical element is sodium phosphate; in the latter it is uric acid.

In the formation of tophi, of all the salts which the serum contains, phosphates, carbonates, oxalates, and quadriurates, the last-mentioned are the first to suffer change. This change consists in the precipitation of bi-urate crystals,—*i.e.,* uric acid. For some reason this does not occur on a soft tissue, but when the menstruum comes in direct contact with a periosteum, or with renal or vesical calculi, the deposition of these crystals takes place quickly enough. They go through a periosteum and anchor themselves in the substance of the bone itself. They will also penetrate a calculus thoroughly, sometimes forming seventy, eighty, and even ninety per cent. of it. They may, and undoubtedly do, exist in deep-seated tartar, as was previously stated, but to a most infinitesimal extent, provided the concretion is so located that the act of mastication occasions the rupture of some of the gingival blood-vessels. This is probably the reason why we find the darkest-colored concretion on the roots the most difficult of removal. Its color is given to it by the hematin of ruptured red blood-corpuscles, and the measure of its tenacity to the cementum is decided by the number of uric acid crystals which have anchored themselves to its surface. But these, in any case, must be extremely few in number, never being in sufficient quantity to give the concretion any of the clinical characteristics of a tophus.

One question more, and we will proceed to consider the names of alveolar disorders. It is this: We hear of hyperplasias, hydremias, hyperplasmas, etc., but the exudation of serum into the pericementum, which it is claimed occurs in its apical part, would be a hyperseruma, a word of which I think none of us has ever heard.

Gomphiasis.

Webster's dictionary defines this as being a disease of the teeth by which they are loosened and fall from their sockets. We all know how inaccurate this is, there being but one type of alveolitis in which the teeth themselves suffer any change. This is general hypercementosis. If it shall be held applicable to the destruction of the pericementum there is this to be said: There are three of these diseases where the pericementum is not affected at all until loosening is very pronounced,—*i.e.,* where there is no longer any gomphosis left, this having changed to a regular articulation.

Loculosis.

Loculus is the Latin diminutive for locus, a place, and is not inapplicable to the socket in which a root is found.

Surely, we ought all of us to be able to testify that when a tooth is lost from alveolitis its socket has nearly disappeared already, and soon thereafter does so entirely.

The adoption of this word was probably due to the misapprehension that when a tooth is loosening in its socket the socket must be enlarging, instead of uncovering the root by the disappearance of its margin, as is the case. Otherwise, I think that the word "loculosis" would have been an admirable one.

We are all doubtless familiar with the signification of the termination 'osis as it occurs in such words as "fibrosis," "exostosis," "pericementosis," "hypercementosis," "sarcosis," etc.,—viz, an enlargement by proliferation of tissue. Nothing but the exact reverse of this ever occurs in the loosening of a tooth except in eruptive pericementosis,—a very rare disease.

I remember that when I was a child I asked one of our men one day where mink live. He told me that they made holes in the banks of the river and lived in them. He was then asked what they did when the spring freshets came. The reply was that they went into their holes and pulled the holes in after them. Nothing else could ever happen when a root leaves its alveolar apartment by so-called loculosis, for there is extremely little of the nature of a loculus left, and very soon thereafter nothing whatever.

"Riggs's Disease"

was considered an entirely satisfactory designation for a long time after Dr. Bishop proposed its adoption, for no one knew at that time, nor does any one appear to suspect at present, that there are several diseases that accomplish the loss of teeth by loosening, all of which are radically different, except as to prognosis,—something which is very seldom, if ever, at the present time taken into account in naming a disorder.

Dr. Riggs's efforts to unveil the mysteries that had always surrounded alveolitis were surprisingly intelligent and successful, considering the condition of the science of pathogenesis during his time. If his name could possibly be made to do duty for all of its types, I would advise its retention as a means of perpetuating the memory of one of our noblest members. Or could any single member of the group be made to serve this purpose I would be pleased to recommend it in this case, although such a custom is not a good one, and is being pretty generally dropped by the medical profession.

"PYORRHEA ALVEOLARIS."

We come now to the next most generally accepted appellation the lesions under consideration have ever borne, one that appears to be taking the place so long held by "Riggs's Disease."

Perhaps it should be enough to say of this designation that only about half the cases of loosening teeth have any pyorrhea about them during their entire histories, unless it is present as indicating a complication with a certain type where it is always seen. As a matter of fact, you listened quite recently to a lecture on "pyorrhea alveolaris" at which an illustrative type was shown to you which never has any pus about it, except under the circumstances just mentioned. It was a case where a tooth was being pushed from its socket by a proliferation of fibrous tissue in its pericementum.

This name, however, was a commendable one, also, for types of the disease had doubtless been too seldom seen when it was bestowed at first, where pus was lacking, to have attracted the notice of any one. Its author deserves much credit consequently for its bestowal, for this constituted a step in advance toward a scientific basis in a respect where advance was much needed.

The types of alveolitis where pus is lacking are the two varieties of atrophy, senile and pressure, both of which are, as a rule, accompanied by coffee cachexia.

Loosening from poisoning by bismuth is also unaccompanied by pus. That from lead and mercury is commonly free from it as well, but it may be present sometimes as a result of complication with the idiopathic type. The same may be said, as was just stated, of eruptive pericementosis, and occasionally of the superficial calcic type. The term is therefore very misleading as a generic one.

But there is still another and much stronger reason for its abandonment. It is nothing but the name of a symptom which is a characteristic of more than twenty quite different disorders, all of which produce a flow of pus from the gums, although they do not all cause a loosening of the teeth. As an appellation for a disease it is fully the equivalent of the words pain, throbbing, or inflammation.

Has any one of us ever heard a physician say that he had lost a patient from the "pain," or the "throbbing," or the "inflammation," or the "swelling"? What would we think of one who would write a death notice giving any of these symptoms as being the disease which resulted fatally? Would you intrust such a physician with the treatment of a serious disorder in the case of any one dear to you? Still, we ourselves commit the same error when we say a patient lost a tooth from "pyorrhea alveolaris."

The fact was referred to a few minutes ago that a lecture was delivered recently upon "pyorrhea alveolaris," and an illustrative example furnished of a type of disease which has no pus connected with it. But the state of our information regarding alveolitis is so ill-defined that the lecturer should incur no censure or even criticism for his course on the occasion alluded to. On the contrary, he is to be commended for hastening to lay before us some clinical evidence of a pathological state respecting which he hoped to gain some information, and knew he could impart some.

It was a brave thing to do, for, so far as he was aware, he might have been exposing himself to complete refutation, or to something even worse. One cannot but admire such an earnest attempt to master a knotty problem, where one is looking not so much with pride upon the success attained as he is to employing such success in attracting attention to phases not as yet understood. Such is the man to whom respect, confidence, and assistance are due.

As previously noted, there are more than a dozen diseases, all exhibiting radical differences, from which teeth are loosened; and I repeat, also, that there is no pyorrhea in about half of them. With some, while the teeth are almost loose enough to be picked out with the fingers, there is not even a pericementitis. With one there is neither a pyorrhea, a pericementitis, nor an alveolitis, and still the tooth concerned loosens and is erupted. I beg permission to remind you also that there is one common, objective, prominent symptom by means of which they may be designated intelligently and with strict propriety, but in a generic sense of course; they induce an alveolitis of the chronic type.

Even the exception terminates in the absorption of the alveolus, so that we would almost be justified in styling it an alveolitis; and probably we are quite so, for it is more than likely that the condition of the alveolus would fully warrant us in doing so during the entire history of the disorder.

Of course, the term "chronic alveolitis" would be generic, as was stated; no one could say, "He has *the* chronic alveolitis;" the proper expression would be, "He has calcic alveolitis," or "atrophic," or "idiopathic alveolitis," etc. At the same time, it would be proper to substitute the word "pericementitis" for "alveolitis" in those types of the disease where there is one during any considerable portion of its course.

"Phagedenic Pericementitis"

is the last one of our misapplied terms to which I will call your attention this evening. Our mistake in making use of it at all is so great, and of so serious a nature, that if we were aware of it we would drop it immediately.

It could hardly be expected that a practitioner of dental surgery should be aware of the changes that are so frequently occurring in the character and signification of the names that were given to pathological conditions from one to two hundred years ago. A moment's thought, however, will convince us that changes in their signification and applicability must occur as we become better and better acquainted with the etiologies and general characteristics of such conditions. Our allied professional brethren are usually active in investigating such matters, and as discoveries are made names are changed in any manner that will adapt them more perfectly to pathological states as these are better understood; or their use is restricted or modified as occasion may require.

I know of no word in all of our medical lexicology that has suffered more radically than has "phagedena" in its general reputation and applicability to diseased tissues, and which illustrates more distinctly the progress which medical science has been making lately. This will be made plain enough by examining the ancient literature upon the subject, and noting the various modifications in significance to which it has been subjected from time to time as the progress alluded to has been taking place. Still I may say, in passing, that, even according to it the meaning it bore when it was first employed, to say nothing of those allotted to it since, it is in no sense whatsoever applicable to any of the varieties of alveolar disease for which we are using it. This will appear to you to be a very sweeping and inaccurate statement, but I ask you to kindly suspend judgment for a few minutes while we look into the subject critically.

I do not know who is the author of the designation "phagedenic pericementitis," but, if he will kindly pardon the implied association, I beg permission to say that when he and I were infants pathogenesis as a science was relatively not much more developed than we were. Its features were yet to undergo such radical changes before its present condition was reached, that a picture of the earlier would not have been recognizable as ever having been that of the science at any period in its career.

The disappearance of organic human tissues was thought to be due to "animalculæ," as microbes were then called. "Phagedena" had consequently for more than one hundred years been considered an accurately descriptive appellation for their performances, and so it would have been had the suppositions about animalculæ been correct.

About the time when he and I were old enough to be strutting around the streets with Latin and Greek grammars under our arms, and were, in our minds, solemnly giving advice to kings and emperors, but taking none ourselves from anybody, unless it was vigorously backed up in some very objectionable manner, animalculæ were passing out of the question, some one having discovered fungoid and parasitic microphytes to which few, if any, animal characteristics could be attributed.

Doubts then arose as to the means by which tissues disappeared, but it was not long before the opinion became general that they were absorbed by the circulation and excreted. At the present time we are pretty well informed, or think we are, which is not always the same thing, about the different processes by which this result is effected, these processes being subject to modification or entire change sometimes by influences which it is unnecessary to mention here. When these doubts arose, the use of the term "phagedena" became much restricted.

The condition which it was supposed to represent was first described as a definite pathological one by Dr. La Motte, of Paris, who had seen a case of it at the Hotel Dieu somewhere about 1720. He did not call it "phagedena," however, his term being "*pourriture*," which is quite the same as our word "rottenness." Not long thereafter the more classical name was bestowed upon it, "*pourriture*" being too suggestive of a state which did not really exist.

After a more extended experience with the disorder it was found best to qualify even "phagedena," and the word "gangrenosa" was added to it. Subsequently, but how long I am unable to say, "contagiosa" was also used in connection with it.

These words did duty for a long time,—some fifty or sixty years,—for there was a general cessation during that epoch of the development of all arts and sciences except that of war.

Upon the recurrence of settled political and civil conditions, attention was again given to scientific matters. Old errors were looked over and corrected, or were thought to be, and new ones were adopted; an example we have been following ever since, and probably always will be. It is more than likely, however, that during this period of practically continuous strife somewhere both of these strange surgical disorders, phagedena and hospital gangrene, had quietly been much more critically observed than ever before by army and naval surgeons. At least this would appear to have been the case, for at the close of the fighting period, one that afforded such unusually fine opportunities for investigating them, it was decided that the two diseases were identical.

The dictionaries published at and subsequent for many years to that period, in mentioning phagedena, ceased giving any definition at all of the word. They simply refer the reader to "hospital gangrene." The latter term gradually became the one most commonly, and perhaps I should say exclusively, employed.

Probably the older ones among us, at least those whose professional education was wholly, or even partially, medical, are familiar with the clinical phases of hospital gangrene. Now, if we bear in mind the objective symptomatology of any one of the various types of chronic alveolitis, those which we so mistakenly term "pyorrhea alveolaris," "Riggs's disease," "phagedenic pericementitis," etc., and recall our impressions of "hospital gangrene" at the same time, we will certainly not be long in concluding that its synonym cannot be properly applied to any one of them, to say nothing of the entire group.

The nearest approach to a condition that even faintly resembles hospital gangrene is found in one of the rarest forms of alveolitis one ever sees,—viz, the one due to lithæmia as a predisposing cause.

But I must not assume that any considerable number of us are familiar with a disease which has been so effectually suppressed at our hospitals as is the case with gangrene. In order, therefore, to make the matter as clear and comprehensible as possible it will be necessary to give a reasonably complete description and history of this disorder, for the brief reference made to it already will, as just stated, serve to show its lack of appropriateness to only here and there one of us.

Mention was sometimes made in ancient medical literature of a mysterious disorder which must have been the one under consideration. It was then termed a "bleeding ulcer," but I can find no references to the extreme rapidity of the ulcerative action that characterizes all cases of phagedena; nor of its contagiousness, a reputation for which it certainly bore subsequently, as the addition of the word "contagiosa" demonstrates. Probably this opinion arose later on account of the advent of another disease which is communicable, and not entirely to closer scrutiny.

Hippocrates called it "cancerous ulcer," and Galen used the word "bulimia" for it. It was long after La Motte described it, something like sixty years, before it was again mentioned by any writer of note, doubtless owing to the reasons specified above; but during the succeeding twenty-five it was given quite a number of notices. In these it was spoken of as "malignant," or "putrid ulcer," and in one "gangrænæ contagiosiæ nosocomiale."

If I remember correctly, for I am speaking of investigations made many years ago, there were at least a dozen physicians and surgeons of note who had written more or less accurately about it during this epoch. Its point of departure, however, as a scientifically considered topic was upon the appearance of Mr. Blackadder's famous work which he called "Observations on Phagedæna Gangrænosa." This was published in Edinburgh in 1818.

I will not attempt to do more than summarize the conclusions reached by him, as they are somewhat verbose; but you shall have the gist of them in as few words as will serve to convey as clear ideas of them as may be. They were fully accepted by his contemporaneous professional brethren, as well as by the lexicographers of his time and for many years afterward, when the word "gangrene" took the place of "phagedena" as a general designation for that which had previously been termed "hospital gangrene." From that time on the use of the former—"phagedena"—became more and more restricted as the profession realized more perfectly that it represented a condition with which ordinary pathology could have extremely little to do. At the present day it may be roughly said that one never hears it used by a physician at all, except in a variety of a disease to be mentioned later on.

Mr. Blackadder says, "The disease, phagedena contagiosa, is communicable only when infectious matter has been applied to a spot on the body from which the cuticle has been removed and a sore already formed. One or more vesicles then appear at the edge of the sore. These are filled with a serous fluid, usually livid or reddish brown, but sometimes watery. If the vesicle has not been broken open a grayish-white or ash-colored slough is formed, filled with clear serum. If it has been ruptured, or if it contains the colored fluid, it puts on the appearance of a thin coagulum of blood of a dirty brownish-black color. During the formation of the vesicle there is generally a change in the sensation of the sore, accompanied with a painful feeling like the sting of a gnat.

"After a slough is formed it spreads with more or less rapidity, until it occupies the whole surface of the original sore; and when left to itself (which not seldom happens) there is little or no discharge, but the slough acquires daily greater thickness.

"When the formation of the slough has been interrupted the stinging sensation becomes more frequent and acute; phagedenic ulceration quickly commences, and such is frequently the rapidity of its progress that even in the course of a few hours a very considerable excavation will be formed, while the parts in the vicinity retain their usual healthy appearance."

I must interrupt making quotations for a moment in order to remind the reader as to the practical unanimity with which all the writers who have mentioned the subject at all speak of the extreme rapidity of phagedenic action, days only being alluded to, while there is no phase or type of chronic alveolitis which does not require years in which to cause the loss of teeth. The other differences begin at this point to be still more plainly marked between the two diseases; so much so that it is reasonably certain that the history of phagedena *must* have been unknown to those of us who use the term.

To resume, Mr. Blackadder goes on to say, "The cavity, the edges of which are well defined, is filled with a thick, glutinous matter which adheres strongly to the subjacent parts. When this matter is removed the surface underneath presents itself of a fine, granular texture, which in almost all instances is possessed of extreme sensibility, and is very apt to bleed when the operation of cleaning is not performed with great delicacy. At each dressing the circumference of the cavity is found enlarged, and if there are more than one they generally run into each other. The progress of the disease is much quicker in some individuals than others, but *it never ceases until the whole surface of the original sore is occupied.*

"The stinging pain gradually becomes of a darting or lancinating kind, and *either about the fourth or sixth day from the time when the morbific matter had access to the sore, or afterward, at the period of what may be termed secondary inflammation, the lymphatic vessels and glands are apt to become affected.*

"The discharge becomes more copious, its color varying from a dirty yellowish-white to a mixture of yellow, black, and brown, depending upon the quantity of blood mixed with it.

"The soft parts in the immediate vicinity of the sore daily become more painful, tumefied, and indurated; and in a great number of cases, particularly in those of plethoric and irritable habits, an attack of acute inflammation speedily supervenes and is accompanied by a great increase of pain, the sensation being described to be such as if the sore were burning. The period at which this inflammation begins to subside is by no means regular. Sometimes it subsides in the course of two days, and sometimes it continues upward of five, depending very much on the constitution and previous habits of the patient, as well as the treatment that has been adopted. During its progress the thick, putrid-looking, and frequently spongy slough which is formed on the sore becomes more and more moist, and of a *pulpy* consistence. (Hence this form of disease is actually named by Gerson *pulpy gangrene.*) In the course of a few days a very offensive matter begins to be discharged at its edges. The slough then begins to separate; by and by it is thrown off, but only to prepare the way for an extension of the disease by a continued process of ulceration and by a recurrence of the last-mentioned symptoms."

It will be seen from the following extract from one of Mr. Cooper's works, which was written some twelve years after Mr. Blackadder's book appeared,—*i.e.*, about 1830,—that the actual nature of phagedena could not escape detection much longer.

Mr. Cooper's opportunities for judging of this disease, or simple complication, as we must soon call it, were probably unsurpassed. He was professor of surgery in the London University College, senior surgeon for the hospital attached to it, surgeon to the queen's bench, etc. His account of phagedena is this,—viz: "The first symptoms which indicate hospital gangrene in a wound or ulcer are a more or less acute pain and a viscid whitish exudation on the surface of the granulations, which lose their vermilion color and present at several points spots of a grayish or dirty-white hue, resembling venereal ulcers or aphthæ. These ulcerated points thus engrafted (as it were) upon the original ulcer soon spread and join together, so as to give to the whole surface of the solution of continuity a gray, ash color. The surface also becomes more or less indurated, and sometimes bleeds. A red, purplish œdematous circle of a greater or less extent is next formed in the surrounding skin. Sometimes, when the patient is of a good habit, the causes of infection less active, and the constitution sufficiently strong, the disorder now stops. According to Boyer, it may not even extend to the whole surface of the ulcer. But most frequently its progress is extremely rapid, and occasionally quite terrifying.

"The edges of the wound or ulcer become hardened and everted; the granulations are large and tumid, being swelled up, as Boyer asserts, with a considerable quantity of gas. They are afterward detached in the form of soft, reddish sloughs, which very much resemble the substance of the fetal brain in a putrid state.

"From day to day, until either nature alone, or aided by art, puts limits to the disorder, it invades new parts both in breadth and depth, so that its ravages extend to aponeuroses, muscles, blood-vessels, nerves, tendons, the periosteum, and even the bones themselves."

Regarding the seriousness and intensity of the disease, Mr. Blackadder says, at the beginning of his book, that, "There was one case in which the half of the cranium was denuded, the bones having become black as charcoal, and the integuments detached posteriorly to the second cervical vertebra, and anteriorly to the middle of the zygomatic process of the temporal bone; and this was originally a superficial wound of the scalp. In another case the muscles, large arteries, and nerves of both thighs were exposed and dissected, the integuments and cellular substance being entirely removed with the exception of only a narrow strip of the former, which remained on the outer side of the thighs. This was also originally a simple flesh wound. In other instances the cavities of the knee, ankle, elbow, and wrist joints were extensively laid open, and in one unfortunate case the integuments and cellular substance on the anterior parts of the neck were destroyed, exhibiting a horrible spectacle, the trachea being also wounded."

Mr. Cooper's generalizing about the clinical history of the disease, however, gives us a better idea of certain points which served as bases for still further restricting the use of the term phagédena than even Mr. Blackadder's "Observations." In this respect he says, "Hospital gangrene must be regarded as one of the most serious and dangerous complications to which wounds and ulcers are liable. When the solution of continuity is large, or of long standing, the disorder commits great ravages, renews its attacks repeatedly, and the relapses prove exceedingly obstinate. The same thing is said to happen when it affects persons laboring under scorbutic or venereal complaints. Hospital gangrene proves particularly dangerous, and mostly fatal, when it complicates contused wounds attended with badly fractured bones. All the soft parts of the injured limb are then frequently observed to be progressively destroyed, and the unfortunate patient falls a victim either to typhoid symptoms, frequent hemorrhages, or hectic complaints. From what has been stated, however, the disease varies considerably in its severity in different cases, being sometimes of small extent, and even capable almost of a spontaneous cure. Patients have been known to continue afflicted more than a month, and when the duration of the disease was thus lengthened the cases almost always had a fatal termination.

"In a few cases the wound puts on a favorable appearance again between the sixth and ninth days, and in slight examples the amendment is manifested between the third and fifth. Whatever may be the period of the complaint, its wished-for termination is always announced by a diminution of pain, the pus acquiring a white color and more consistence and losing its fetid, nauseous smell.

"The edges of the ulcer subside, while its surface becomes less irregular and puts on more of the vermilion color. The red, purplish, œdematous circle which surrounds the disease assumes a true inflammatous nature; and the solution of continuity, restored to a simple state, heals up with tolerable quickness, even when the destruction of the soft parts is somewhat considerable, unless any fresh untoward circumstances occur to prevent cicatrization. But sometimes when the patient is on the point of being completely well again his condition is suddenly altered for the worse; ulcerated spots make their appearance on the cicatrix, and these, spreading in different directions, occasion a relapse, which may happen several times."

Another step in the transformation of the significance of the word is furnished to us by Mr. Blackadder's conclusions. These are as follows:

"No. 1. That the morbid action could almost always be detected in the wound or sore *previously to the occurrence of any constitutional affection.*

"No. 2. That in several instances the constitution did not become affected until some considerable time after the disease had manifested itself in the sore.

"No. 3. That when the disease was situated on the inferior extremities the lymphatic vessels and glands in the groin were observed to be in a state of irritation, giving pain on pressure; and were sometimes enlarged before the constitution showed evident marks of derangement.

"No. 4. That the constitutional affection, though sometimes irregular, was in many cases contemporary with the second or inflammatory stage.

"No. 5. That all parts of the body were equally liable to become affected with this disease.

"No. 6. That when a patient had more than one wound or sore it frequently happened that the disease was confined to one of the sores, while the other remained perfectly healthy, and this even when they were at no great distance from each other."

The final division between, or separation of, phagedena and hospital gangrene into two entirely separate diseases began with these "Observations," but I will make one more extract from them by way of rendering this still more apparent. On page 46 Blackadder quotes, with evident approval, a late writer who says, "Whatever may be the source of this disease, it is at least sufficiently ascertained that when it occurs its propagation is only to be prevented by the most rigid attention to cleanliness, and by isolating the person or persons affected so as to prevent all direct intercourse between them and the other patients; for, so far as I have had an opportunity of observing, ninety-nine cases in the hundred were evidently produced by a direct application of the morbific matter to the wounds, dressings, etc., while others who were in every other respect equally exposed to its operation never caught the disease. In attempting to prove this by experiment, I have placed three patients with clean wounds alternately between three other patients severely affected with the disease. They lay in a part of a ward which was appropriated for patients who were laboring under the disease, and of whom at the time there was a considerable number. Their beds were on the floor, and not more than two feet distant from each other; but all direct intercourse was forbidden, and they were made fully aware of the consequences that would follow from inattention to their instructions. The result of this trial was that not one of the clean wounds assumed the morbid action peculiar to the disease, nor was the curative process in any way impeded."

It may be best to stop here a moment in order to make a short *résumé* of the different steps of the progress which has been made thus far in ascertaining and assigning to phagedena its proper place in pathology, since we have arrived at the threshold of the position it is destined to occupy in future. Hospital gangrene had been noticed and written about, although in a manner which we now consider singularly vague, ever since the days of Galen,—*i.e.,* from 1650. But a case of it associated with phagedena was first given a reasonably clear description in 1722. The two diseases were thought to be one for about a century, when circumstances became more favorable for scientific investigations generally than they had ever been before.

Differences were now discovered to exist between hospital gangrene and phagedena. A reconciliation was effected at first for a time by using the two names together, but after about twenty years had elapsed these differences were found to be too radical for this. Within twenty-five years more a separation had been definitely made between the two diseases. As the peculiarities of phagedena come still more clearly into the light its similarity to another disorder, even if it is not actually one of its divisions or symptoms, renders its association with and confinement to it necessary. We now find the word phagedena allotted some consideration by the dictionaries,—*i.e.,* instead of being followed by the words "vide Hospital Gangrene," it is given long descriptions, to which the latter term would not apply.

During the greater part of the time when the signification of the word "phagedena" was indefinite, or in its transition stage, the one corresponding to it, "phagédéne," was not employed by the circumspect French at all, having been dropped apparently by general consent. The twelfth edition of their great standard medical dictionary—that of Litré et Robin—does not contain the word, although it gives place to its adjective "phagédénique," and also to the substantive "phagédénisme."

The cautious people of that race are extremely conservative in the matter of placing themselves on record, being very seldom, if ever, so precipitate as we are in respect to stepping out into the darkness. It is phenomenal to hear of any one among them doing such a thing as to form and publicly maintain a hypothesis or postulate unless he has previously exhausted every available means to inform himself as to their accuracy and appositeness to the subject in mind. Aside from their admirable principle about such things, which would control the majority, it must be confessed that the remainder would be held to good behavior only by the fear of ridicule, which, however sturdy they may be, is an extremely potent influence with all the Latin races; to such an extent, in fact, as to be incomprehensible to us. Physical torture may be most bravely, even stoically, borne, but ridicule never with the least equanimity; the line is rigidly drawn here. All of us have heard of instances where exposure to it has been followed at once by suicide. This same potent force is, of course, equally efficient in the way of limiting their criticisms to those subjects to the mastery of which they have given such care and time as their opportunities have permitted them to devote to the purpose. I wonder how a recommendation to this effect would be received by my professional brethren in this country? If our lamentable indifference to ridicule ever changes to a proper dread of it, what a scramble there will be for back seats! Not long ago I read a profound and deeply scientific article on "pyorrhea alveolaris" which a friend sent to me as a curiosity. I cannot, of course, say that its author never saw a case of the disease, although this seems to be plain enough; but, unless the paper was intended as a joke, or to ascertain to what extent human credulity can go, I am quite unable to account for the perusal and sober discussion it received. Were the production of such papers exceptional this reference would, of course, not be made. On the contrary, they are so common among us that, as one of our members says, "if they were all to be forced upon the attention of any intelligent dentist they would drive him crazy."

The dictionary of Litré et Robin says in regard to "phagédénique," translating somewhat freely, but still as accurately as the languages will admit, "This word is applied to ulcers which eat into the neighboring parts, and also to substances that are employed in cauterizing, or forming an eschar with, swollen flesh. It is applied principally to ulcers caused by chancres, or a bubo which has evacuated itself or has been incised. It extends principally in width, but sometimes in depth, resisting cicatrization for months, may be, and sometimes for years."

Of phagédénisme the work says, "Phagédénisme consists in the indefinite extension of a chancre upon the surface of the body. . . . If we divide the period of evolution of a chancre into three parts, phagédénisme would comprise the first,—*i.e.,* that one where the ulcerative action exceeds the reparative one.

"Phagédénisme does not occur except among those whose constitutions have become impaired in some way, notably by chloroanemia, alcoholism, certain diathetic conditions like the cancerous, tuberculous, scrofulous, etc. The treatment in such cases is, of course, constitutional. . . . Ricord has shown us that there are infectious chancres of the phagédénic type. Phagédénisme, however, is only an accidental complication with sores of this character, and may develop with either the hard or soft variety. Still, it is certain that the latter, the soft variety, are so much the more frequently affected that its appearance upon a hard one must be considered exceptional."

In an editorial article in one of our leading medical journals which was issued in 1898 this phrase occurs: "In the old, old days of medicine, some ten or twelve years ago." (Schrady.) No one who has followed the footsteps of recent medical advancement will have any fault to find with such an observation.

Now, in view of the changes that have taken place in the meaning and applicability of "phagedena" already, we are fully prepared to find that a definite status has at last been reached for it. This is the case, and we find it in such bad company that we must leave it alone.

In 1894 Foster's great dictionary was published, the preparation of which had required many years, extending well back before the "old days of medicine." Of phagedena he says, "A form of ulceration in which the soft parts are destroyed rapidly in large masses. See Hospital Gangrene." Of the latter the following description is given: "A serpiginous, phagedenic diphtheria, consisting in a serpiginous necrosis arising from *specific causes* (probably from bacteria which do not appear to be identical with diphtheritic fungi) and spreading over fresh or granulating wounds the surfaces of which, together with the neighboring skin, are transformed into a slimy, yellow pulp, or into crater-like depressions penetrating deep into the tissue." I presume I do not need to call your attention to the word "specific" just used. But, this aside, it is hardly supposable that any of us has ever seen a case of "phagedenic pericementitis" to which the description just given of hospital gangrene will bear much of a resemblance. Serpiginous means spreading rapidly.

Two years after Foster's great work appeared,—in 1896,—Keating's was published. He says, "Phagedena—a malignant ulcer progressing very rapidly. Phagedenic ulcer—an ulcer which rapidly destroys the surface." I wish to remark here that if there were anything whatever of a phagedenic nature about a pericementitis, the gums could not possibly escape infection.

The following year White and Martin published their book on "Genito-Urinary and Venereal Disease." Of phagedena they say, "It comprises the following conditions,—viz, chancrous, chancroidal, penile, syphilitic, and traumatic (where the urethra is ruptured and gangrene occurs)."

In 1898 Rose and Carless's "Manual of Surgery" came out. On page 1104 they say of phagedena that "It is a form of spreading ulceration rarely met with at the present time except in venereal disease, and, according to most authorities, seldom apart from syphilis."

In regard to the ulcer they say, "The phagedenic ulcer is one in which destruction occurs very rapidly, and is usually associated with sloughing. Formerly it was very common as one of the varieties of wound infection, the result of bad hygiene and unsanitary surroundings in hospitals. Nowadays such a condition is never seen, having been entirely stamped out by antiseptics. *Phagedena is at present only met with in venereal disease.*"

Now, as dental surgeons, we are not responsible for the propriety or impropriety of this conclusion, but we have much to do with the fact that it has been reached, and *is the doctrine being taught to medical students to-day.* If, therefore, we continue using the term referred to, it is easy to imagine what complications may arise. Suppose, for instance, that a young lady becomes engaged to be married. She has been forcing tartar under her gums in mastication. It concretes on the neck of a tooth. More and more is added till the pericementum has been impinged upon and suppuration results. Before entering upon her new life she visits her dentist for the purpose of having her teeth placed in order, and is told that she has "phagedenic pericementitis." She tells her intended, and he asks his physician what the term means. He is told. Tableau! Would any of us care to be in that dentist's place during the next few months?

This latest definition of "phagedena" is probably one that will be permanent. At present we will be to some extent pardonable for having employed it, but we shall need no one's advice to let it alone in the future.

Now, my friends, as a parting word, permit me to remind you that those theories, creeds, and hypotheses which are destined to relapse into obscurity always carry with them the seeds of their own dissolution. By this is meant, of course, that there will always be some evidence to be found, if we only know where to look for it, that Nature's laws, which we all believe to be absolute, invariable, and irrevocable, have been contravened in some manner. Let us give our attention primarily to those laws, and before we accept a hypothesis, no matter by whom nor how strenuously it is advocated, let us see if it is in accord with that which is or can be known of those laws. If doubts present themselves, we are justifiable in reserving our conclusions till those laws can receive more thorough consideration, and we shall thus save ourselves from undergoing some very embarrassing experiences. If our acts are likely to form the subjects of public review, we shall find ourselves forfeiting the consideration of those whose support may be essential to our welfare. In the measure of our tenacity in maintaining indefensible positions, just in that proportion are we preparing for ourselves an earlier or later withdrawal of public confidence from us, to say nothing of demonstrations of actual hostility or ridicule. If we do not care for the opinions of our professional brethren, the preservation of the good name of our calling should be an object of importance to all of us.

[Since the above was written the term "Interstitial Gingivitis" has appeared. Respecting this appellation I will only say that, out of the dozen or thirteen diseases which loosen teeth, it seems to me to be applicable to only three; being therefore, I think, much more inappropriate than even "pyorrhea alveolaris," which may be used for twice that number.]

REPORT OF COMMITTEE ON LEGISLATION AND STATE BOARDS TO THE NATIONAL ASSOCIATION OF DENTAL EXAMINERS.

To the National Association of Dental Examiners: Your Committee on Legislation and State Boards beg leave to submit, for such consideration and disposition as in your judgment seems fit, the draft of a dental law, the object of the several provisions of which we trust will not be wholly lost in reviewing its imperfection or in contrasting it with Utopian ideals.

We offer no argument in behalf of its adoption and recommendation to the states, but we do most sincerely ask that the subject of legislation and of the operations of Examining Boards be considered in connection with the objects expressed in our constitution, —to wit,

OBJECTS.

Article 2. The objects of this association shall be to secure, through the operation of the various State Examining Boards, a high and uniform standard of qualification for dental practitioners, and, as far as practicable, uniformity of methods in the working of these boards and of legislation in creating them;

and with reference to the rightful demands of the profession as expressed in state and local societies, in our journals, and in personal communications.

No one can be quite fully impressed with the intricacy of the questions and the complexity of the problems involved in adjusting fairly and satisfactorily the differences which obtain in the profession, even among examining boards, in respect to dental laws and their administration unless he has made the effort to formulate a plan which the profession could be expected to indorse.

But because the conditions in many of the states are so deplorable as to forbid the expectation of an early adoption of uniform laws, we should no longer delay the beginning of a work that certainly should soon lead to uniformity in the essentials of several state laws and eventually of many more. Nor should we be unmindful of the right of the profession to expect of us a definite and unequivocal expression of the terms on which we are willing to settle the questions involved.

It is much more important that the terms be just and fair to all concerned, than that they be accepted and indorsed as the profession's standard for dental laws.

Before the reading and disposition of the draft, we ask your indulgence for a word in regard to the matter of "uniformity in the standard and method of conducting the examinations and the other duties devolving upon the different boards."

In this regard we respectfully submit the proposition that "a high and uniform standard of qualification for dental practitioners" cannot be established except "through the operations of the various State Examining Boards," and "uniformity of methods in the working of these boards and of legislation in creating them," as was wisely recognized by the organizers of this association.

While the unification of the dental laws of more than ten or fifteen states may not be accomplished for quite a number of years, the unification of board standards and methods may be at once inaugurated by a number of states now having the authority of law to determine the scope and character of the examinations required to test the fitness of applicants for license.

We believe that an earnest effort to this end is the immediate duty and most essential object of this organization. And we further believe that there is a sufficient number of state boards at liberty to enter a compact to work in unison under a system which will soon demonstrate the ability of boards to establish a uniform standard of qualification for those whom they may examine. Were only a few boards to enter the compact, they would find such a relation mutually helpful in enhancing their efficiency and improving their methods of work, besides inaugurating the movement.

To test the feasibility of this idea and the sense of this association on the practicability of "uniformity of methods in the working of these boards," we recommend:

First, an immediate canvass of the several boards represented at this meeting for pledges to voluntarily enter a compact of boards for the purpose of co-operating, as far as each may do so lawfully, in the establishment of a standard of qualification to be met by examination tests.

Secondly, the creation of a committee of three, to be known as the State Board's Advisory Committee (if five or more boards agree to enter the compact), whose duty shall be,—

(a) To formulate a general plan of conducting board work; which plan shall include every detail of testing the fitness of candidates for license, such as uniform applications, examination questions of uniform value, stated practical demonstrations, a common plan for marking answers, fixed average to be attained, and, as far as practicable, a common date for holding examinations.

(b) To endeavor to secure the acceptance of the plan by boards not here represented.

(c) To put the plan in operation at the first examinations held in 1900.

(d) To make written reports of its work annually to this association.

Thirdly, the Advisory Committee to be further charged with the duty of inducing such state boards as may not lawfully accept the general plan of the Advisory Committee, but may work on a common plan with other states having a higher standard, to form a group and work in unison on a plan corresponding in principle, and as far as may be in particulars, with the general plan of the Advisory Committee.

WHEREAS, The health and comfort of the public, and in many instances the lives of individuals, are contingent upon intelligent and competent dental service; and

WHEREAS, This public necessity for educated and efficient practitioners of dentistry is evidenced by the exercise of the police power of the state to this end in forty-seven states and territories of the United States, and in all civilized foreign countries; and

WHEREAS, There obtains in these several states and territories and foreign countries great incongruity in the legal standard of qualification and diversity in the methods of ascertaining professional fitness, thereby defeating the public demand for uniformity and working hardship alike to the educated beginner and to the experienced practitioner; and

WHEREAS, It is therefore expedient, and in response to the interests of the public, to the recognized need of uniformity in the educational methods of the fifty odd dental colleges and dental departments of state universities, and to the concerted efforts of ethical bodies of the dental profession, that the following bill designed for adoption by the several states and territories be enacted by this state.

SECTION 1. *Be it enacted,* etc. It shall be unlawful for any person to practice dentistry in this state who is not lawfully so engaged at the time of the passage of this act, or who is not thereafter licensed so to do in compliance with the provisions of this act.

SEC. 2. That there be, and is hereby created, a board of dental supervisors, to be known by the name and style of the State Board of Dental Supervisors, consisting of, *ex-officio*, the Superintendent of Public Instruction, the president of the State Board of Health, and the president of the State Dental Society.

It shall be the duty of the said board to supervise and control the carrying out of the purposes of this act, and to this end it shall have authority to make such rules and regulations, not inconsistent with the laws of this state or of the United States, as it may deem expedient. Before entering upon the discharge of his duties, each member shall subscribe to an oath to fairly and impartially administer the same.

SEC. 3. The said board shall meet and organize within sixty days from the passage of this act, and hold two stated and such special meetings as it may deem necessary each year.

In case of absence of a member from any regular or special meeting, the attending members may designate a member of the Board of Dental Examiners to attend and represent him, and the person so designated shall, for the time being, have authority to act as a member of the said board. Said board may elect its secretary from other than its own members.

Said board shall prescribe forms of application for license to practice dentistry in this state and may require a verification, under oath, which it is hereby authorized to administer, of all statements contained in or relating to such applications.

It shall receive all applications for examinations and license to practice dentistry.

It shall refer to the State Board of Dental Examiners for examination or investigation all applicants who appear from their applications to be entitled thereto; and may reject any application for material omission, irregularity, or failure to verify its material statements.

It shall receive with each application the fee prescribed, and permit an applicant to withdraw his application and fee any time before the reference of such applicant to the State Board of Dental Examiners.

It shall appropriate and pay from such fees the expenses incurred in carrying out the purposes of this act, including such an equitable compensation for the services of the members of the two boards herein provided for as may be agreed upon by the said boards.

It shall publicly announce the time of its meetings, with a brief of the requirements of applicants for license.

It shall receive from the Board of Dental Examiners its recommendations and the reports of its operations, and shall approve or refer back such parts thereof as are not approved.

It shall consider the report on examinations and investigations, and determine therefrom the time and the conditions on which it will refer an applicant for re-examination without fee, which time and conditions must have reference in each case to the need of further educational training of the applicant otherwise qualified.

It shall prescribe forms of license; and each license issued shall include a statement of the requirements with which the licentiate complied and the recommendation based thereon signed by the Board of Dental Examiners, followed by the indorsement, signature, and seal of the Board of Dental Supervisors.

It shall promptly grant and issue licenses on such recommendations of the Board of Dental Examiners as it may deem to have been made in accordance with the purposes of this act.

It shall make a full record of its transactions, and files of all applications for license, with a brief of the action taken thereon; and such record and files shall be open to public inspection, under proper restrictions as to their safe keeping; and in all legal proceedings such record and files, or a transcript thereof certified under the seal of the Board of Dental Supervisors, shall be *prima facie* evidence of the statements contained therein in any court of this state.

Said Board of Dental Supervisors shall make, annually, a report to the governor of such of its proceedings, including a record of all applications and licenses issued, as it may deem of public interest.

SEC. 4. Be it further enacted that there be, and is hereby created, a Board of Dental Examiners of the State of ———, consisting of five active members, each a resident of, and for the three years last before appointment actively engaged in the practice of his profession in this state. The members of the said board shall be appointed by the governor with sole reference to their professional fitness, and shall be selected from a list of persons double the number of appointments to be made, certified to him as fit and eligible by the State Dental Society. The appointments first to be made shall be one for one year, one for two, one for three, one for four, and one for five years; and thereafter each appointment shall be made for a period of five years.

Vacancies shall be filled for unexpired terms in like manner as original appointments.

Three members shall constitute a quorum.

The governor may remove any member, on the concurrent recommendation of the Board of Dental Supervisors and the Board of Dental Examiners, for neglect of duty, incompetency, or unprofessional conduct.

All appointees, before entering upon their duties, shall subscribe to and file with the Board of Dental Supervisors an oath to faithfully and impartially perform the duties of their office.

Said board may elect such officers, and from time to time adopt such rules as may be necessary for the orderly performance of its duties; and may make recommendations concerning the methods of carrying out the purposes of this act to the Board of Dental Supervisors.

SEC. 5. It shall be the duty of the Board of Dental Examiners to hold meetings semi-annually, in the months of May and November, at which it shall conduct, under the supervision of the Board of Dental Supervisors, the examinations and investigations required by this act, and may hold such special meetings and do such work through *ad interim* committees as it may deem advisable to facilitate and shorten the work of its semi-annual meetings.

It shall conduct the investigations required to be made in lieu of examinations as to insure to the public safe, efficient, and legitimate professional service.

It shall make separate report on each candidate examined, stating the examination average in each branch and the general average, and without unnecessary delay transmit the same to the Board of Dental Supervisors.

STANDARD OF QUALIFICATION.

SEC. 6. The standard of qualification for practitioners of dentistry in this state is and shall be as follows:

Good moral character;

Twenty-one years of age;

Graduation in dentistry based on an entrance requirement in general education equal to the second year high school course and a professional course of study of not less than three years, which course shall include three regular terms of lectures of not less than six months each, ending in separate years, in the following subjects:

Anatomy, physiology, chemistry, materia medica, therapeutics, pathology, the fundamentals of general surgery, dental surgery and oral surgery, in connection with clinical training in the practical branches of dentistry, and laboratory course of instruction in chemistry, bacteriology, histology, and prosthetic dentistry;

Together with a demonstration of ability to make an average of seventy per centum on an examination conducted by the Board of Dental Examiners in the subjects and branches named.

Provided, That when the majority of the dental college students of the United States are required to meet a college standard higher for entrance and more advanced for the professional course than herein prescribed, then and in that event the Board of Dental Supervisors may, acting in concert with ten or more state or territorial boards having the authority of law to do so, change the standard of qualification of this act to correspond with the advanced educational course required of a majority of the dental college students of the United States, and such change shall take effect six months after it is made and proclaimed.

Provided further, That the scope of the examinations shall be limited to the subjects embraced in the advanced course of the higher class dental colleges, and shall not exceed the extent to which such subjects are taught in such colleges at the time such examinations are held.

LICENSES.

SEC. 7. Licenses to practice dentistry in this state shall be granted to all persons who apply therefor in prescribed form and pay a fee of fifteen dollars, and who, in the concurring judgment of the Board of Dental Supervisors and the Board of Dental Examiners, comply with the standard of qualification prescribed in Section 6 of this act.

Provided, That the said boards shall deem equivalent to compliance with the said standard of qualification the fulfillment of any one of the following alternatives, to wit:

First, for and instead of graduation based on the entrance requirement and professional course prescribed, the presentation of a license issued by a state, territory, or foreign country, with evidence satisfactory to the said boards that such license was obtained in good faith and actually used for the purpose of practicing dentistry in the state, territory, or foreign country in which it was issued; and in other respects complying with the said standard of qualification.

Secondly, the presentation of a license to practice dentistry issued by a state, territorial, or foreign authority with evidence which, on investigation by the said Board of Dental Examiners, proves to the satisfaction of the said boards that the said license was granted after the licentiate had fully complied with requirements identically or substantially the same as the said standard of qualification.

Thirdly, The presentation of a license issued by another state, territory, or foreign country, prior to the adoption by such state, territory, or foreign country of a standard of qualification identically or substantially the same as that prescribed by this act, with evidence which, on investigation by the Board of Dental Examiners, proves to the satisfaction of the said boards that the licentiate possesses educational attainments and has had experience in reputable professional practice which are together substantially equivalent, as a safeguard to the public, to compliance with the said standard of qualification; but no application for a license under this clause shall be considered unless the applicant has been licensed by a state, territory, or foreign country which, at the time of his application, prescribes identically or substantially the same standard of qualification, and equivalents thereof, as are herein prescribed, and which grants licenses to the licentiates of this state on the conditions herein provided for the licentiates of other states, territories, and foreign countries.

Sec. 8. And be it further enacted that any person, partnership, association, or corporation practicing dentistry in this state shall display conspicuously in his or its office or place of practice the license to practice dentistry of each person there so engaged.

And no person, partnership, association, or corporation practicing dentistry in this state shall use a false name, or use as a name or designation the name or designation of any other dentist; or of any society, association, or organization of dentists; or any name, designation, or title which implies, suggests, or may be taken for a dental educational institution or professional organization; and any name, designation, title, or address which is not herein prohibited, other than the true name or names of the licentiate or licentiates practicing thereunder, may be used only in immediate connection and constant association with the true name or names of each licentiate practicing thereunder.

And no person, partnership, association, or corporation shall permit any person not licensed to practice dentistry in this state to perform any dental operation as his or its agent or employe, or in his or its office, or in connection with his or its practice; and no corporation, association, or partnership shall practice dentistry in this state either through agents, employes, or its individual members unless each member of such corporation, association, or partnership be a person licensed to practice dentistry in this state, and each of its agents or employes who performs any part of such practice be a person licensed to practice dentistry in this state.

Sec. 9. Any person shall be deemed to be practicing dentistry within the meaning of this act who, as principal, agent, employer, employe, assistant, instructor, student, pupil, or experimenter, or in any other capacity whatever performs any operation or prescribes, applies, or advises the use of any remedy, drug, or other agent for the relief, cure, or treatment of any disorder, disease, or malposition of the human teeth or jaws;

Provided, That this act shall not be construed to prevent a physician authorized to practice medicine in this state from performing operations and administering remedies in such dental cases as are incident to the ordinary practice of medicine; nor to prevent a licentiate of another state from being called in specified cases in consultation with a licentiate of this state; nor to prevent the licentiate of another state from performing operations at a public clinic under the auspices of an ethical dental organization; nor to prevent a student of a reputable dental college from performing dental operations in the college infirmary, without fee, as a part of the regular course, and while in the immediate presence of and under the actual instruction of a dentist duly appointed to give such instruction; nor to prevent a *bona fide* student pursuing a regular uninterrupted dental college course from becoming a *bona fide* pupil of a licensed dentist during the vacation intervals of such uninterrupted dental college course, and performing dental operations as a pupil in the immediate presence of and under the actual instruction of his preceptor for persons knowing him to be a pupil; nor to prevent an unlicensed person from performing merely mechanical work on inert matter in a dental office, or from rendering unskilled assistance to a licensed dentist; nor to prevent the mere family or neighborly use of domestic remedies without fee or gift of any kind.

SEC. 10. PENALTIES.

(To be provided to suit the penal code and the judicial system of each of the states adopting the foregoing.)

(Signed) WMS. DONNALLY,
J. F. DOWSLEY,
W. M. BARTLETT,
Committee.

DENTAL ELECTRICITY.

BY L. E. CUSTER, B.S., D.D.S., DAYTON, OHIO.

(Read before the National Dental Association, August 1, 1899.)

IT seems quite in keeping with this subject that we should this year meet in the presence of the most wonderful and extensive plant for the production and utilization of electricity in all the world. Nowhere can be found such marvels of mechanical and electrical ingenuity as are contained in the Niagara plant. Not only are the machines and devices for generating current remarkable in themselves, but the various appliances for utilizing it are unique and wonderful as well. And, as we are about to visit these plants, this seems an opportune moment for the consideration of dental electricity.

It was scarcely more than a hundred years ago that Galvani, while dressing frogs for his dinner, noticed the electrical effect of suspending them upon an iron grating with a copper wire, and yet the demonstration of an electric current by the muscular twitching of the frogs' legs, feeble as it was, was the beginning of the wonderful electrical demonstrations we see about us.

The experiments of Galvani were taken up by Volta, and the invention of the Voltaic battery soon followed; and even at this early date in the history of electricity this energy was utilized. The electrolytic property of the galvanic current was noticed by Davy, and the discovery of many elements was effected through the electrolytic decomposition of substances formerly supposed to be elements.

The electro-magnet, the central organ in all dynamo machines, as well as in machines for using the current, was the third great step in the development of modern electricity. This was the joint work of Oersted and Ampère, in the early part of this century, and was followed by the invention of the magnetto by Faraday, in 1831. While Faraday's machine, which was simply an appliance which provided for the rapid movement of a conductor in front of the poles of a permanent magnet, was the foundation of all modern mechanical appliances for generating current, it was not until electro-magnets were substituted for the permanent magnets of the field in 1866 by Farmer, Varley, and Siemens that the generation of electricity took a commercial form. Up to that time electric phenomena were scarcely more than laboratory experiments. The substitution of electro-magnets for the permanent magnets of Faraday's machine was the fifth and most important step from a commercial point of view. It made out of a toy which might be held in the hand the enormous machines of our city plants. The efficiency of the magnetto was limited by the degree to which a permanent magnet might be saturated, but the efficiency and output of the electro-magnetic machine or the modern dynamo is limited only by the problems of heavy machinery.

In this manner the feeble current of electric energy observed by Galvani was seized by the inventive, and the appliances for developing and utilizing it have increased in proportions and efficiency until to-day the electrical business in all its branches actually controls the world.

As the production of commercial electricity has increased, the uses to which it may be applied have been proportionately broadening. The invention of the incandescent lamp, the perfection of the arc lamp, and the invention of the electric motor went hand in hand with the improvements in dynamo machines, and many other appliances of less importance were devised; and the utility of the current has increased until to-day there is scarcely a field that has not been invaded by this fluid. Art and science owe their most recent progress to electricity; mechanics would be helpless without it, the successful practice of medicine and surgery can no longer be accomplished without its assistance, and the dental practitioner, while he has always employed it to a greater or less extent, to-day, more than ever before, finds new uses for this wonderful energy. The more recent and valuable advances in dental practice are due to modern electricity. Not only are many appliances in both branches of dentistry being operated by electricity in one form or other, but the methods of practice are being molded by it. Difficult operations are made easy and complex ones are simplified.

No one knows what electricity is, and but few have attempted to tell us, yet its manifestations are all about us. It is the agent in the formation, growth, and death of all animal and vegetable organisms. It is the unseen hand at work in nature, the cause of barometric changes, the formidable agent which now and then shatters and tears the atmosphere, terrifying you with the crash of thunder. It transmits the enchantment of a look and the grace of a smile. It lights and heats our homes; it runs our factories and cars, and can almost carry our voice around the globe. By some it is regarded a property of all matter; some have thought it to be a vibratory molecular motion, some a fluid, some two fluids, some a motion in the ether, and some the ether itself. We can only study it comparatively. The resemblance of its phenomena to those of heat and light place it in that class of energy. We have heat, light, and electricity derived from friction, from chemical action, from magnetic action, and from the sun. Heat produces electricity, and electricity produces heat. If the junction of a thermopile be heated a difference of potential will be established, or if a current be passed through the couplet the junction will become heated. A crystal of tourmaline, and many other crystalline bodies, when heated at one end show a difference of potential. Electricity also produces light, and will neutralize the polarizing effect of light. Hence, from the facts well known as to the nature of heat and light and their reciprocal action with electricity, we may infer many of the facts in regard to the nature of electricity. Heat and light are each regarded as a mode of molecular motion, and while electrical phenomena are of greater variety and oftentimes present themselves in complicated forms, yet all these, when simplified and understood, show that electrical phenomena are due to an energy not unlike heat and light.

Electricity is being largely used in medicine and surgery, but its uses are confined principally to electrolysis, light, heat, and the X ray, and, except in a very few instances, are more of the many properties of electric energy utilized. The stimulating effect of the faradic current is useful in many of the nervous lesions, and the electrolytic effect of the galvanic current is of unquestioned value in the treatment of hypertrophies. At one time it may be used to stimulate nutrition, to excite muscular contraction, and to exalt sensation, and at another it may be used to modify blood-supply, to relieve pain, or to destroy tissue. It may be used to operate the surgical engine, to give light, and it may be a medium of sound transmission for diagnostic purposes; and yet the range of useful applications as practiced in medicine at present is narrow when compared with dentistry. In general medicine, when the practitioner uses any electrical appliances further than the cautery or lamp he rises almost to the dignity of a specialist in electro-therapeutics. While this is true of the use of electricity in medicine, the same may be said of many other vocations of men, and when we correctly estimate the needs of each one the unbiased mind will agree that no profession, science, or art has such varied demands for its successful practice as dentistry, and no single agent meets more of these requirements than electricity as at present developed.

In the past the only practical applications of electricity were such as could be derived from battery power, but the output of the battery as a source of electric energy was so small as compared with the bulk that even the room space was no small consideration. The care necessary to keep in good working order was a burden, and the great complication of the parts made electricity a formidable and uncertain agent. On this account, if the dentist used electricity at all, his battery consisted of but a few cells, and he was content to use only such instruments as required but little electric energy to operate them. As a matter of fact, the first applications of electricity were in the form of light power, such as would operate the armature in the shocking machine, or later on the electric mallet, cautery, and mouth-lamp. Altogether, the battery as a source of electric energy, while it was practical and successful in the hands of the few who understood it, did not prove so in the hands of the majority, and this cast a shadow upon the advent of commercial electricity as supplied at this day. Many no doubt have hesitated about installing modern electricity in their practice for no other reason than that it has not been a brilliant success as supplied by battery power in the past. But the hesitating dentist should bear in mind that he has no longer to do with the making of the energy, but with the use of it as furnished to him by two or three wires. The supply of commercial electricity has become an industry engaged in by corporations and companies for supplying cities and towns, and the operation of an electric plant on a small scale has been made so simple that many public buildings, hotels, and private residences operate their own.

When the dental office is equipped with commercial electricity as at present supplied, the current becomes as reliable as water or gas, and he is relieved of much care. Then, too, the instruments for using the current are highly perfected. The current is supplied at a given pressure, which is maintained at all times with wonderful accuracy, and the instruments using it are made for that pressure. With an electric system operating at 110 volts a lamp when burning plainly shows a departure of five volts either way from the standard. For this reason the operator need not at any time be concerned about the working of his electrical instruments when they are used upon the current for which they were intended. His supply is always the same, and he need only see that the connections are properly made. The electric light and heating appliances require no special care, and the other operations of electricity go on with like freedom from care on the part of the operator.

While we are in the dark as to the nature of electricity, it has, however, been found to produce results as accurate as a rule in mathematics, and when properly understood can be depended upon. A given current forced through a known conductor under a given pressure always produces the same amount of magnetism in an iron core, the same rise in temperature in the conductor, or deposits the same amount of metal from its solution. It is even possible for the electrician to accurately estimate beforehand the exact amount of heat that will be produced by the various arrangements of quantity, pressure, and resistance. The operations of electric energy are so constant and ever-present that they are made the basis for the measurement of electricity. The various forms of electric meters operate under one or a combination of well-known electric laws.

Nearly all operations in dental practice require the utmost accuracy in the application of energy, whether in the form of power, heat, light, or chemism, and principal of the characteristics of electricity is the accuracy of its operations under like conditions when desired. Moreover, the perfection and ease in regulating or varying its action for different degrees of intensity are important considerations. The speed for revolving the bur, the heat for the desiccation of dentin, for softening gutta-percha, for annealing gold, or for fusing porcelain should be to suit each case at hand. These conditions are not always alike, and electricity obeys the throw of the rheostat lever so accurately and quickly that, as if by magic, the will of the operator is felt at the instrument under operation. After a little experience his control over each appliance through the rheostat becomes almost automatic. The pianist in reading a piece of music does not think of the movement of each of her fingers as they glide over the finger-board, or of the management of the pedals with her feet, and so it is in the manipulation of a well-constructed electrical instrument. There is no effort at calculating how a certain thing is to be accomplished, but quite involuntarily the mental image of what is to be done being formed, it is done. The electric dental engine as perfected to-day increases or decreases its speed, stops or reverses at the touch of the operator, and all this is so easily done that after a little use it requires no effort on the part of the operator. The mental routine ceases and the control becomes automatic, and the attention of the operator, instead of being divided between the management of the instrument and the operation, may now be concentrated upon the latter.

The pressure of commercial current as used for incandescent lighting is practically the same at all times, so that each contact button of the rheostat always gives the same rate of speed to the engine or the same heat to heating appliances, and by a glance at the rheostat the rate of current flow is noted; or a predetermined requirement of energy for a given purpose or instrument can always be accurately obtained thereafter by using the same contact button. The flow of water from a faucet or gas from a burner cannot be more closely regulated than a current of electricity by means of the rheostat. The great variety of rheostat appliances that can be made for modifying the strength of the electric current, the fineness of their gradations, and the perfection of control, at once makes it possible to use the same current for the heaviest motor work or for the most delicate cataphoresis. No energy at our command has such a wide range of action and is at the same time so easily and accurately regulated as electricity.

The cleanliness of electricity is another feature of this energy, and one that is especially desirable in dental practice. The one thing prominent in the use of electricity is the cleanliness that may be preserved in whatever form it is used. There is no device used for power purpose that is so cleanly as the electric motor. Water power and the small gas engine are the only other available power appliances, and these are open to serious objections. Water power is not always available, and the gas engine has so many undesirable features that but few dentists have used it. The latest electric motors are lubricated with thick oil, and the bearings are so designed as to provide for constant lubrication and at the same time preserve perfect cleanliness. It may therefore be placed at any convenient point about the chair without fear of soiling the immediate objects.

The electric light has advantages over other forms. The atmosphere is not robbed of its oxygen, and the air is not vitiated by the products of combustion. A small light can be inclosed within the mouth without discomfort, or a large one may be hung at any desired position about the chair. The heat radiated from the incandescent bulb is not enough to set fire to objects with which it may come in contact, so that it can often be used where a gas or oil flame would not be permissible.

While the cleanliness and purity of electrical heat would alone recommend it for use in a dental office, there are some processes in dental practice in which electrical heat, by its purity and wide range, is especially adapted, as, for instance, the purity of heat for annealing gold or for fusing porcelain, or the range of heat from the softening of gutta-percha to the melting of platinum. Pure heat is of solar origin, and yet when heat is produced by electrically heating a conductor which does not oxidize or undergo any change, as is the case with a platinum or iridium conductor, this heat is practically pure. It is without gas or odor, and can be easily regulated. The range of electrical heat depends upon the manner in which it is produced. If it is obtained by the resistance of the conductor, then the highest limit of the heat will be the melting point of that conductor. If platinum or iridium be used as the conductor, for instance, the range of heat will be as high as the melting point of these metals, or about 3600°; if it is the heat of the arc, it will be nearly 6000°. While the latter is the most intense heat that man can produce, it can at the same time be manipulated by the hand of the operator without inconvenience or danger to life, again illustrating the fitness of electricity in dental practice.

A feature characteristic of electric energy is the very small amount of noise in its operations. As a matter of fact, there is no noise in any operation of electricity itself when properly used, except the arc tone or the sharp report following a voltaic discharge. The sputtering of the arc light is due to bad carbons or imperfect adjustments, and the noise of the motor is due more often to badly shaped armatures and poor adjustment of the brushes than the flow of the current. These are faults of the instruments themselves, and not of the energy which operates them.

The other applications of electric energy go on without any audible sound. An oven may be heated to the melting point of platinum, and there may be a horse power of energy in operation, but it cannot be heard. The incandescent lamp glows, and all galvanic processes go on without sound.

Another feature which commends the use of electricity in dental practice is the flexibility of the system. For the operation of engines and lathes, instead of using one large machine for all purposes, which is necessary where other motive power is used, small motors may be used for the several kinds of work. By the use of flexible cord the current can be brought to any desired place in the apartment and a separate motor may be used, one to operate the dental engine, one to operate the lathe, one for the fan, and as many as are desirable for other purposes. In this way a motor may be used which is especially adapted for a particular kind of work as to capacity and speed, and the operation of several such motors will be more satisfactory and economical than where one large motor is used for all purposes.

There are four commercial currents which are in use at the present time, but not all are suitable for dental purposes. The arc light and 500-volt, or car, current are of too high pressure to be brought into the dental office with safety. Moreover, the appliances which can be operated by them are not of great variety, and they possess no advantages over appliances which can be used on currents of lower pressure. Where no other current is available the careful dentist, however, may charge a storage battery from these two currents, and he may operate a suitably wound motor or an oven on the 500-volt current, but beyond these applications the higher pressure currents are not of much value. In a few instances a motor-dynamo has been employed by the dentist to reduce the 500-volt current to 110 volts, which can then be used with impunity.

The third commercial current, the alternating, is found as a rule in small cities and towns, where the field of distribution extends over a large area with few consumers. This consists of a primary current, a transformer, and a secondary current. The primary current is sent out at a high and very dangerous voltage, and courses through all the transformers. From these transformers, which are supplied to each consumer, a secondary current of safe voltage is led into the house. The usual pressure of the secondary or house current is 52, or 104 volts. This is perfectly safe, and meets all the requirements for lighting and heating. When used in the dental office, however, its uses are restricted almost entirely to the same, and only under certain conditions can it be used for power purposes. This current can light the office, operate the mouth-lamp, and it can by its heating effect be used to operate the cautery, the electric oven, and gold annealer; but beyond these applications it is of little value. It has no electrolytic effect, and it cannot therefore be used for such purposes. It cannot be used for plating or for cataphoresis, and possesses no especial therapeutic value.

The fourth and last current which may be used in the dental office is the Edison, or constant current. This is the ideal dental current, and fortunately it is the one most frequently met with. This system is the most economical and satisfactory for supplying heavy current within a short radius, and it is for this reason that we find it in common use in the business portions of nearly all cities. It is, moreover, so easily installed and operated that many people have their own private plants, and there is scarcely a large building, hotel, or office building but which operates a plant of this kind.

This current is usually supplied at 110 volts pressure, which is maintained with wonderful accuracy at all times. This gives a range which covers all the applications that may be made in dentistry. It is high enough for heating and lighting and the operation of motors, or with a properly constructed rheostat a current of the fraction of a volt pressure can be obtained from it for the most delicate cataphoric work. Another feature of value is that when working at this pressure a heavy current for melting platinum and for other heating purposes can be obtained more economically than when a higher pressure is employed. In fact, a current of a higher voltage than that at which the Edison current is regularly supplied cannot be employed for many purposes without a loss in wasteful resistance.

The Edison current at 110 volts gives the widest range of useful applications, and it is for this reason that I would call it the ideal dental current. Being perfectly safe, and at the same time of a voltage to cover the highest requirements, it may be used to light the office, to operate the motor, to heat all heating appliances; it may be used as a galvanic current, and with the interrupter will produce the faradic. It may be used for the removal of tissue and for stimulating nutrition. It can be used for electro-plating, for cataphoresis, and for the X ray. In short, there is no effect produced by electricity or by other commercial currents which is found to be of value in dentistry but which can be obtained from this current. It possesses the desirable virtues of all the others combined.

I will not consume your time by going into the details of the various applications of electricity that are being made in dentistry at present, further than a brief *résumé*. Under the head of power, the electric mallet has certain advantages over other forms of malleting which make it a highly valuable appliance. The electric motor has no equal for power purposes in the dental office. Its cleanliness, freedom from noise, its perfection of control and high rate of speed, are not to be found in any other power appliance. The supplanting of the pedal engine by the electric engine has done much toward giving a professional tone to a part of dental practice which heretofore has been necessarily on the order of mechanical labor. The movements of the dentist while operating the pedal engine differed but little from the performance of a scissors grinder in the eyes of the public. The electric engine has added tone to the dental office and dignity to the dentist. The electric lathe in which the motor is made the lathe-head itself is not only an ornament to the dental office, but does away with much machinery. It is self-contained, and in a few inches of space we have a complete lathe which heretofore has been the central figure in the laboratory. The electric motor has other uses. It may be used to compress air, and, while most of the manifestations of electricity are accompanied by heat, it may at the same time be used for keeping the office cool. The electric fan is a luxury to both patient and operator.

In taking up the second property of electricity we are surprised at the large number of useful applications of electrical heat in dentistry, and, moreover, the wide range of heat in meeting them all.

There are no less than a dozen practical uses that are being made of electrical heat alone. It may be used for the desiccation of dentin, for softening gutta-percha, for warming water, and for the sterilization of instruments; for annealing and fusing porcelain, for igniting the gas or alcohol flame, and for fusing platinum; for the therapeutic application of heat, and for cautery purposes. The most humane appliance in dentistry is the use of the warm air tip for the desiccation of sensitive dentin. Electrical heat, as no other heat, can be accurately regulated by means of the rheostat to suit the requirements, and it is possible to produce a blast of air precisely at blood heat. At the other extreme, the electric current can be used to heat the cautery and root-drier, and to fuse platinum. Then there are the two processes in dentistry to which electrical heat by its purity is especially fitted, for the fusing of porcelain and annealing gold. When we consider that five years ago the number of porcelain workers of the whole dental profession was scarcely more than a hundred, we can in a measure realize the utility of the electric oven. The electric annealer produces a heat for annealing gold of which a prominent teacher says, "The most perfect method yet suggested is through the medium of the electric gold annealer. Even to operators who have been accomplishing apparently satisfactory results by other means, this appliance will soon reveal a working quality to the gold which seems impossible of attainment in any other way." In the same manner gutta-percha may be softened to any degree, instruments may be tempered to any hardness, and alloys may be made without oxidation.

The electric lamp is one of the best means for mouth illumination and for diagnostic purposes. A half-candle-power lamp may be used in any part of the mouth without discomfort to the patient.

The electrolytic property of the constant current may be used for cataphoresis and for plating. I may be questioned by some in calling cataphoresis an electrolytic process, but, inasmuch as it partakes largely of a transfer of elements and is accompanied by phenomena not unlike those present in ordinary electrolysis, the ground taken here has as much support as if cataphoresis were classed as a distinct property of the electric current. However, the efficiency of cataphoresis for the treatment of sensitive dentin, for the projection of agents into the pulp for its destruction, for the lining of root-canals, for the treatment of pyorrhea, and for the bleaching of teeth has never been questioned.

The X ray has quite as appropriate and useful a place in dental practice as in any other field. It is my belief that as the X ray appliances and their working become simplified and the dental uses for it become known, this means of diagnosis will find extensive use in dental practice.

It is indeed wonderful when we consider that two flexible wires scarcely larger than a thread can convey to the operating table sufficient energy to operate a one-horse-power motor, and it is still more wonderful when we consider that the same current that operates the motor can, by its heating property, be used to fuse a set of teeth, to melt our platinum, to anneal our gold, to soften gutta-percha, to warm water, or to desiccate dentin; by its electrolytic property to plate our instruments, crowns, and bridges; to carry an anesthetic into the dentin, to stimulate nutrition, or to destroy tissue; by its incandescent effect to illuminate the mouth, and by the X ray enable us to see through the body. When we consider that all these widely different requirements of energy, both in property and quantity, are to be obtained from the same wire, we can in a measure estimate the value of such an agent in dental practice.

When we look back over the comparatively short history of the dental profession, we are struck with the wonderful and rapid progress that has been made. Each decade has been marked by improvements that have revolutionized preceding methods of practice, and with the advent of commercial electricity a subtle fluid has found a place which is not only modifying established methods, but threatens to become the controlling influence in improvements that may follow. The great variety of methods and operations which go to make up the successful practice of dentistry calls not only for broad attainments on the part of the dentist, but for a great variety of agents and appliances. The many properties of electricity, every one of which is of service in dentistry, are but slight indications of what part electricity will take in the dental practice of the future. If even at this day, when we do not know what electricity is, it has become the most useful and extensively applied energy, covering all the fields of human activity, what may we expect in the future? Just as the various tissues and organs receive their nutrition and growth through the complete net-work of vessels carrying the life-blood to and from them, so are the needs of men being supplied through a complete net-work of electrical conductors with an energy as potent and useful in its applications as they are numerous. The coming developments and applications of electricity promise even more, and the practice of dentistry, as well as the other professions and arts, will to a large extent be influenced and aided thereby.

ROENTGEN RAYS.

BY C. EDMUND KELLS, JR., D.D.S., NEW ORLEANS, LA.

(Read before the National Dental Association, August 1, 1899.)

"I set you up a glass where you may see the inmost part of you."—HAMLET, *Act 3, Scene 4.*

ABOUT twenty years ago Dr. Wm. Crookes, an eminent English chemist and physicist, made a study of the properties of matter in high vacua, the results of his observations being made public in 1879.

He constructed what is now so well known as the "Crookes" tube, the original form of which is shown in Fig. 1.

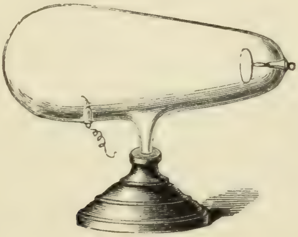
This so-called "tube" consists of an oblong glass globe from which the air has been exhausted to the one-millionth of an atmosphere. Through the smaller end a platinum leading-in wire is fused, upon the inner extremity of which is secured a concave aluminum mirror termed the cathode. Another platinum wire, termed the anode, is blown in the lower part of the tube near the other end, and a glass stem, for the purpose of its better handling, also permits of its being held in a wooden base.

If the negative pole of an induction coil be led to the aluminum disk and the positive pole of the same coil be connected to the other terminal, upon the excitation of the coil the most wonderful phenomena occur within the tube.

These are accounted for by Dr. Crookes as follows: When gases are under their normal atmospheric pressure they are conceived to be composed of an infinite number of molecules, which are in constant motion in all directions at a degree of rapidity beyond conception.

Now in this "tube" the rarefaction has been carried to such an extent that there are relatively but few molecules of air remaining therein, and they are therefore free to bound from side to side or from end to end of the tube, and in this condition Dr. Crookes claims to have discovered a new form of matter, which he terms "ultra gaseous," or radiant matter.

FIG. 1.



Upon the excitation of this tube under the conditions just described the molecules radiate with tremendous velocity in straight lines from the aluminum disk, cross in their focus, and strike the glass upon the opposite side, there producing the most beautiful fluorescence. These rays, originating from the negative or cathode terminal, have been termed "cathode rays."

Dr. Crookes's investigations, it would appear, were confined entirely to this radiant matter and its *effects within* the tube, for which purpose he constructed numerous forms of tubes and studied the various properties of the newly-discovered "radiant matter," under different degrees of exhaustion of the tube.

For seventeen years the Crookes tubes were to be found in all parts of the land, and scientist and student were equally charmed with their study and the effects obtained from them.

But it remained for Professor Wilhelm Roentgen, of Würzburg, to send a thrill of surprise and incredulity throughout the civilized world when he announced that however beautiful were the features produced within the tube by the cathode ray, of vastly more wonder and importance were the effects produced beyond the confines of its glass walls.

In this age of surprises probably none has been greater than the announcement of the discovery of the Roentgen ray, which he, in his (un-American) modesty, termed the "X ray," with its power to penetrate substances that had hitherto been opaque to any rays known to science, and differing from ordinary light rays in that they pass through all substances more or less, and in straight lines, it having been found so far impossible to either deflect, reflect, or refract them.

Furthermore, he also discovered that they had the power to affect photographic plates precisely like the ordinary light rays.

The history of his discovery is as follows:

One evening he was at work in his darkened laboratory when suddenly he discovered that some paper saturated with the platino-barium cyanid which he held in his hand became slightly luminous. A few steps in one direction and the fluorescence disappeared; a few steps in another and it returned. Looking about for a possible cause, he discovered that a Crookes tube which he had been using some time previously and had left connected to his induction coil and excited had been covered with a black cloth. Upon approaching this tube, covered as it was, the fluorescence appeared; upon going away from it the fluorescence lessened and disappeared. Here was a discovery. A ray of some kind hitherto unknown, and even now invisible to the eye, was being emitted by the Crookes tube, passing through the black cloth and affecting the paper in his hand. He at once entered into the study of this most wonderful ray, and in December, 1895, announced his discovery to the world.

Probably the fact which renders this discovery of utmost interest and usefulness, as well as adds to its fascination, is the power of the ray to penetrate the human body.

Upon the original announcement of this discovery almost every one the world over who possessed a Crookes tube and an induction coil began experimenting, and most wonderful were the tales told of the power of the "Roentgen ray." Flaws were to be detected in armor plate, smugglers could no longer delude custom-house inspectors, facial blemishes, such as birthmarks, could be eradicated, the sex of the unborn child could be distinguished; nothing was incapable of accomplishment by this means.

However, it was not long before the real value and use of this powerful agent was realized, and things settled down to a more practical and successful basis; and its value in surgery and other branches of the healing art is fully appreciated at the present time.

The essentials for producing the Roentgen ray are, first, the apparatus for exciting the tube; second, the tube itself; third, means for utilizing the ray as it is produced.

Of the first, there are three kinds of machines suitable for generating the necessary current for exciting the tubes, the one in most general use being the induction coil.

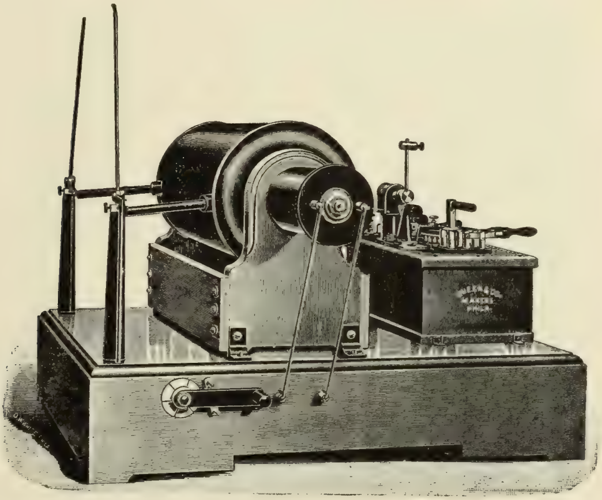
While any coil that will give a spark of four inches or more is capable of producing Roentgen rays, yet there are details in its construction that will render one coil superior to another for this work; and the more powerful the coil the larger the tube that can be used, and the better will be the results obtained.

Thin, weak sparks will not produce results obtained by good, *fat* sparks, as they are called.

Fig. 2 shows to what perfection the Ruhmkorff coil (so called from its designer) has reached, as constructed for Roentgen ray work. This is made by Queen & Co., of Philadelphia, and the one in question is capable of giving a spark fifteen inches in length. The voltage of the current capable of jumping this distance is estimated at 150,000. I say estimated because this figure is reached by calculation, there being no apparatus capable of measuring such high-tension currents.

This form of induction coil can be constructed so as to be operated either by the ordinary Edison incandescent lamp current or by primary batteries, or by secondary, usually improperly called storage batteries. Therefore an apparatus of this kind can be obtained to meet almost any conditions of the requirements of the operator.

FIG. 2.



The well-known static or frictional electric machine will also furnish a current suitable for the excitation of the Crookes tube, and as this may be operated by hand power, and is thus self-contained, it has a field for itself.

However, the larger machines should be operated by power, either by an electric or water motor.

There are some objections to this machine, however, which render it not so popular as the others, although it does have its advocates.

Fig. 3 represents the latest type of Ranney-Wimshurst-Holtz machine, made by the Waite & Bartlett Co., of New York.

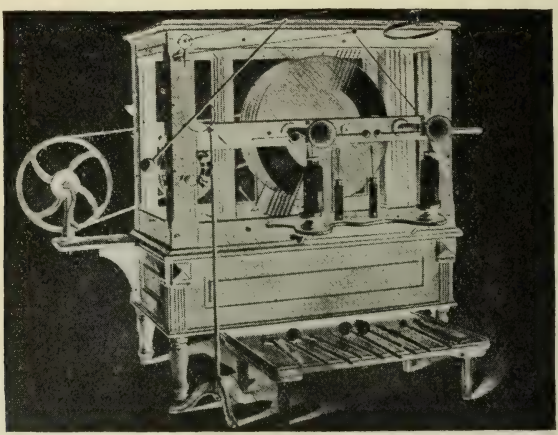
The Tesla coil, bearing the name of its distinguished inventor, a modification of the induction coil, is a most beautiful machine and splendidly adapted to the production of Roentgen rays, and the most powerful effects may be produced by it.

The essential difference between the induction and the Tesla coil lies in the number of discharges emitted by each per second. These in the former are limited by the number of vibrations of the circuit-breaker, which upon ordinary coils never exceeds one hundred per second, while in the Tesla coil this runs up into the tens and hundreds of thousands per second.

By using the Wehnelt interrupter (a very late discovery) upon the induction coil, the discharge then closely resembles that of the Tesla coil when operated at its lowest number of vibrations.

This coil is only furnished to be operated by the direct (Edison) or alternating current, so that its use is limited to fields where such may be reached.

Fig. 3.



This is the form of apparatus that I use.

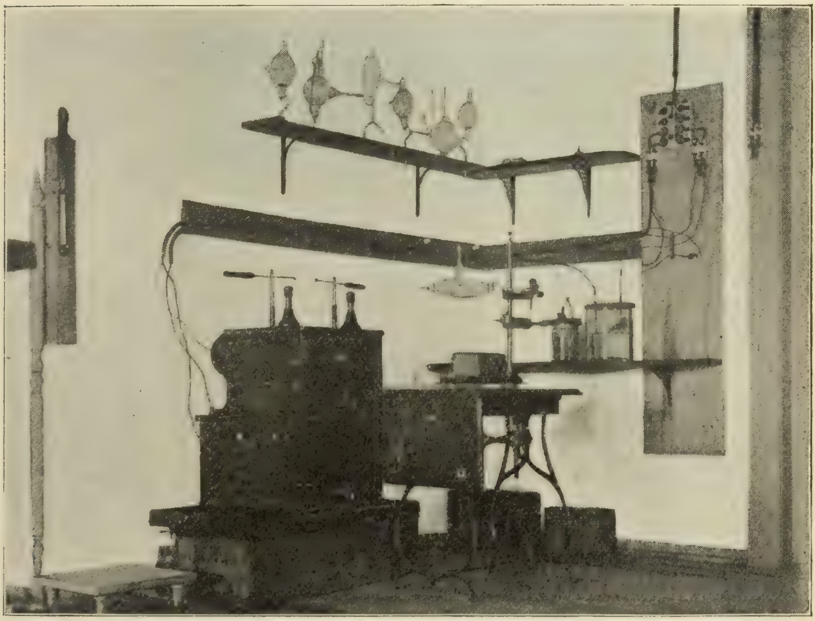
Fig. 4 shows one corner of my experimental laboratory, with the apparatus ready for use. With the single exception of its non-portability, I believe it has all the advantages of either the induction coil or static machine, and many others which these do not possess. It is always ready for use; the simple closing of a switch starts the machine. The current-breaker is non-complicated and easily regulated by a water rheostat; the amount of current is under the most perfect control and capable of the most minute regulation; all of which are points of the greatest advantage to the operator. Many most beautiful experiments are also capable of being produced by this apparatus, and it is, in fact, a never-ceasing source of study and of pleasure.

There is no doubt, however, that tubes are more liable to be punctured when used upon a Tesla coil than by either of the other forms of apparatus, and once this occurs the tube becomes instantly useless, and must be returned to the maker, who may or may not be able to repair it. So far I have yet to find a maker who can account for this, but the loss of many tubes attracted my attention to the subject, with the following results:

Primarily the high-tension discharge produced by the Tesla coil is of a decidedly different character from that generated by the ordinary induction coil, and I believe is of infinitely higher potential; therefore it is practically impossible to thoroughly insulate either the tube or wires leading thereto.

While it is the general impression that an alternating current machine has no positive and negative poles, I am convinced that this is an error, and that there is a decided difference of potential between the terminals of a Tesla coil. Furthermore, I became assured that my tubes were usually punctured by the current leaping from the *positive terminal* to the tube, and thence to ground.

FIG. 4.



To overcome this trouble the following was devised: First, the tube stand was insulated from the table by two glass plates separated by porcelain knobs. Next, the positive terminal of the coil was always connected to the terminal of the tube opposite the stem, and the negative wire to the terminal nearest the stem. Next, a stout piece of wire was grounded by a lighter one and placed in such a position that the free extremity was about three-fourths inch away from the terminal near the stem of the tube. In operation, instead of there being the usual play of sparks from the terminal of the tube *toward the glass stem,—the dangerous feature,*—this discharge now takes place *toward* the grounded wire and away from the tube, and thus liability to puncture is avoided. Since this method of prevention was devised I have not lost a tube by puncture, and I would suggest its adoption, or at least trial, to other users of the Tesla coil.

This detail is shown in the illustration.

Having thus tersely described the apparatus necessary for exciting the tube, we next come to the second group, or the tube itself.

Almost immediately upon the announcement by Professor Roentgen of his discovery the then present form of tube was found to be inefficient, and its improvement was undertaken at once by many minds. I myself was present when one of the early operators took a skiagraph of a hand in twenty minutes, which was not an unusually long exposure at that time. When I state that this one shown in Fig. 5 was taken in less than one second,or the one-twelve-hundredth part of that time, you will readily recognize what vast improvements in the apparatus and methods of manipulation have been made since then.

FIG. 5.

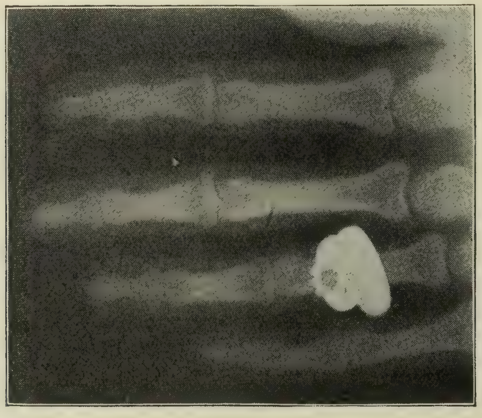
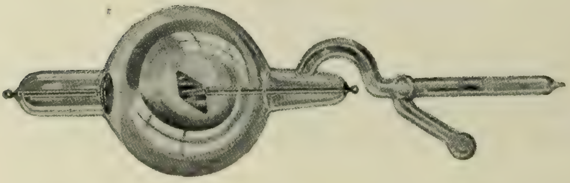


FIG. 6.



While there are many forms of Crookes tubes upon the market to-day, the essential features are the same in all; special differences in details add to their advantages and render some more suitable than others for the different machines for which they are intended.

Fig. 6 represents the usual form of to-day. In this the original concave aluminum cathode is still present, but instead of allowing the rays to cross at their focus and impinge upon the glass walls opposite, which would soon melt in a very highly excited tube, at this point of focus is placed a flat piece of platinum, upon which the cathode rays impinge and are reflected.

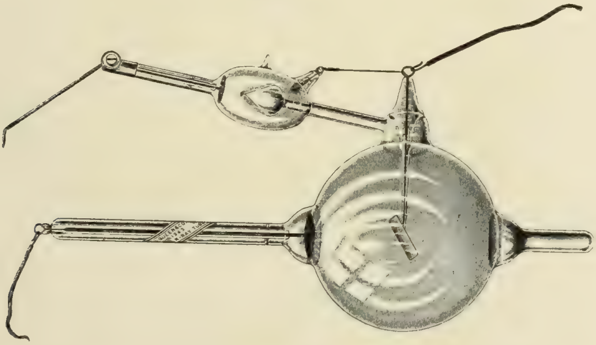
Here the cathode rays terminate and the Roentgen rays originate, but the cause of their origin is still a matter of speculation, and the various theories upon the subject should form no part of this paper. Suffice it to say that the rays do originate at this point.

The advantage of this platinum reflector is that much more powerful currents may be used before the platinum will melt, and therefore stronger rays are produced.

When a tube is exhausted to the proper degree for the best results to be obtained, by use its vacuum rises, and it will eventually reach such a degree that the Roentgen rays are no longer produced. This is caused by the molecules of air adhering to the glass walls.

Heating the tube by an alcohol flame will drive them off and thus reduce the vacuum, but this is not an altogether satisfactory method, and to overcome this objectionable feature a small auxiliary bulb (as shown) is connected with the tube and partly filled with caustic potash. When the vacuum becomes too high this bulb is carefully heated by an alcohol lamp; a portion of the potash vaporizes, and the vacuum may thus be reduced to the proper degree. This may be repeated, if no puncture occurs, until finally the tube becomes blackened by use, caused by the deposit of platinum upon the walls, when its inefficiency is so great as to warrant its being discarded.

FIG. 7.



A suggested improvement upon this was the surrounding of this bulb of potash by a fine wire connected to a battery, so proportioned that the wire could be heated by the electric current therefrom, and its temperature regulated by a rheostat, but this has not proved satisfactory in practice.

An incandescent lamp attached to the tube was the suggestion of Dr. Wm. J. Morton, but that also has not been a practical success. Other devices of like purpose have been tried, but the one first mentioned, that of the caustic potash or similar salt in an auxiliary bulb, is, I believe, the method in most general use to-day where the regulating is not automatic. It will be seen at once that this method of regulating, while satisfactory to a certain extent, is not all that is to be desired, and it remained for Messrs. Queen & Co., of Philadelphia, to bring out the first tube capable of automatic regulation, which is shown in Fig. 7.

This is a most beautiful piece of workmanship, and ingenious as well. Here the caustic potash bulb is heated by the current that operates the tube, and by varying the distance between the two terminals of the adjustable spark gap any degree of exhaustion that is within the limits of the tube can be obtained, and remains practicably stable. In this connection it is well to observe that for different purposes a slightly lower or trifle higher vacuum may have its advantage.

It has been found that different degrees of the vacuum give better results for different parts of the body, and a lower vacuum is better adapted for photographic plates than for the fluoroscope. Furthermore, it has been found that the best results are only obtained when such an amount of current is put through the tube as to heat the platinum reflector or anode intensely. Consequently this is liable to be melted and the tube ruined. Naturally, then, the minds of the workers were set to solve this problem, and with the following results:

FIG. 8.

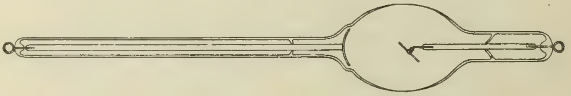
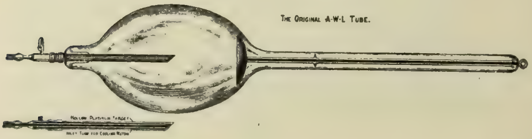


FIG. 9.



The tube shown in Fig. 8 has a circular target pivoted in its center, while the point of focus of the cathode ray is near its periphery. Should a hole be melted in the platinum disk, a slight jar will cause the target to rotate slightly, when a new plane surface is brought to focus. Certainly a very ingenious device; but this is only temporary, as it is only a question of time when the target will be used up.

A more effective method is the prevention, rather than the cure. Fig. 9 shows a Crookes tube with the anode in the shape of a tube within a tube, which allows a stream of water to be constantly impinging upon the back of the target, thereby keeping its temperature down, so that the most powerful generators may be used upon such a tube without danger of melting the platinum.

Both of these latter tubes are made by W. E. Oelling, of Boston.

The tubes so far illustrated have but one cathode disk and a flat platinum reflector, and are devised for use upon the induction coil or static machine. When, however, a Tesla coil is used, the current being alternating, a modification is necessary, as shown in Fig. 10.

These are called double focus tubes, from their having two focusing disks, or cathodes, to each of which the terminals of the machine are connected, while no connection is made to the reflector, which in this case is V-shaped. While there are other forms of tubes suitable for this coil, I believe this is the most satisfactory one.

It has been stated by some operators that on account of its construction, with its double focusing point, as fine pictures in the matter of clearness and detail cannot be produced by this as by the

FIG. 10.

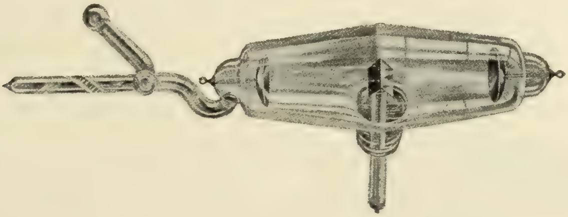
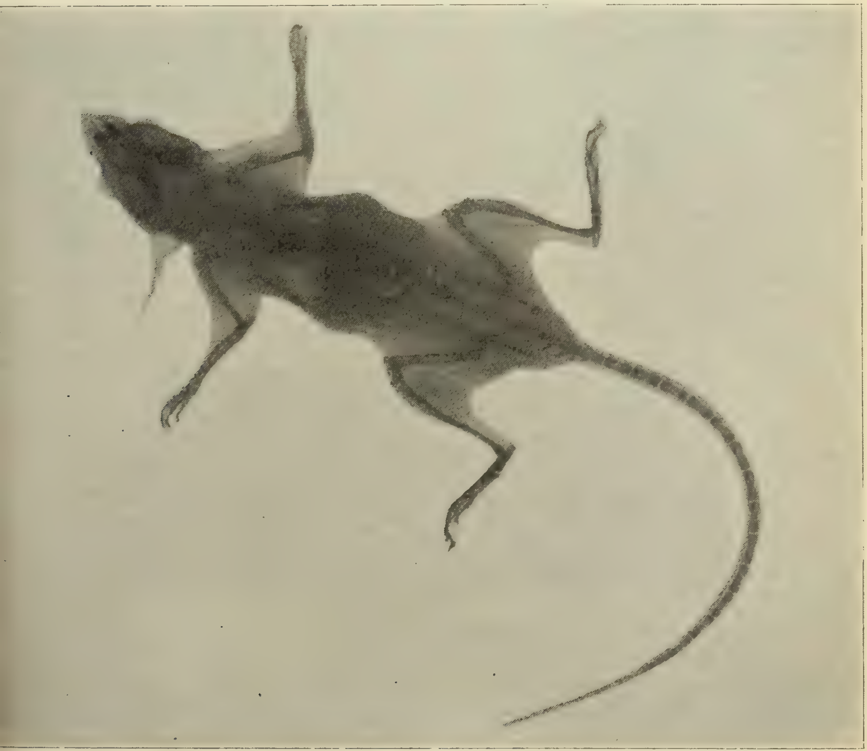


FIG. 11.



single focus form. This I believe to be a mistake, as here is a picture of a mouse (Fig. 11) taken by me in which the detail is absolutely perfect. And another (Fig. 12) of a part of a lower maxillary bone, which I trust speaks for itself. So that I believe that as fine work in regard to detail and shortness of exposure can be produced by the Tesla coil as by any other means.

We next reach the third classification, or means for utilizing the ray as it is produced.

The Roentgen ray is invisible to the human eye, and can be recognized only by its effects upon objects other than the retina.

You will remember that in describing Professor Roentgen's discovery it was stated that he was led to it by the fluorescence of the paper in his hand. The advantages of the power of fluorescence by this ray, in addition to its action upon a photographic plate, were early appreciated, and led to the invention of the fluoroscope, as it is called.

FIG. 12.

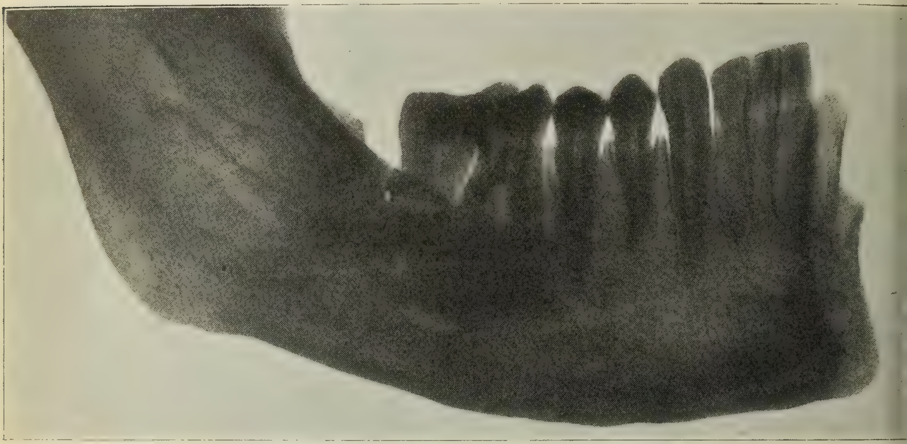


FIG. 13.

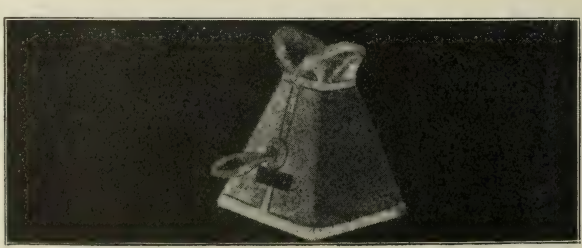


Fig. 13 shows this instrument, which is so well known as to need no further description other than to say that the platino-barium cyanid has been found to be the best substance for the fluorescent screen; and in its present shape is really the invention of an Italian, Professor E. Salvoni, and which he originally called the cryptoscope. By means of this instrument the fluorescent action of the rays is utilized to its fullest advantage. Its operation is as follows: When held before a properly excited tube the entire surface of the screen, within the fluoroscope, becomes highly fluorescent. If now any body is held between the screen and the tube, a shadow more or less distinct is cast upon the screen. When the hand is held between these the rays penetrate the fleshy parts with ease and the outline is lost to view, but the bones, being more opaque, stand out in bold relief. One does not see through any object by means of the Roentgen ray, but the rays cast the shadow upon the screen; and this only is observed.

Most important is the fact that photographic plates are susceptible to the effects of these rays in question; the result of which is that any shadow picture that may be seen upon the fluoroscope can be permanently recorded upon a photographic plate.

Manufacturers early experimented with different characters of films for coating plates and celluloid backings for this special work, with the result that they claim that some specially prepared plates possess certain advantages over the ordinary; and I believe for certain classes of work such is the case.

Once the new art of producing pictures of the invisible was accomplished, it became necessary to baptize them with a name. Many were suggested by numerous men of science and others, but those which proved most acceptable were "skiagraph" and "radiograph," both of which are in general use to-day. Sometimes we see skiagram, but most frequently the former.

A disposition was shown to connect Professor Roentgen's name with the subject; for instance, "Roentgengraph" was suggested, but no really good euphonious word containing his name could be constructed.

Skiagraph, from the Greek, means a shadow picture, and is therefore an appropriate term, as these are distinctly shadow pictures. That "skia" also means "ghost" is hardly an objection, but perhaps renders it more suggestive.

Up to this time the general use of the Roentgen ray has been confined to making fluoroscopic examinations and skiagraphs of the human body. For many purposes a visual examination is all that is necessary, but for others it is essential to obtain a picture of the object of interest.

The use of the Roentgen ray in dentistry is of the utmost value, as it will reveal certain conditions that obtain within the alveolar process that are positively unobtainable by any other means. In cases of unerupted teeth it removes our work from the realm of guesswork into that of exact knowledge, and is now indispensable in the practice of orthodontia. The locating of broken roots and ascertaining to a certain extent their shape is frequently of great value. A skiagraph of a partly erupted or encysted third molar, showing the general position of its roots, is invaluable in many cases. The examination of the roots of replanted and implanted teeth, and their surrounding tissues, opens up a most interesting field for study. While a small fluoroscope screen, as suggested by Dr. Rollins, of Boston, may be arranged so as to obtain a view of some of the roots of the posterior teeth, I am confident that such an apparatus would not prove as satisfactory as in a skiagraph, and I therefore have never experimented in that line.

To obtain a good skiagraph certain elements are essential, which are, first, necessarily a powerful generator, that the length of exposure may be reduced to the minimum; second, a photographic plate or film best adapted to the Roentgen ray, and, third, it is necessary to have the plate held perfectly still in its position, as close to the object to be skiagraphed as possible, and at the same time the plate should lie perfectly horizontally with the object, and both at right angles to the source of the rays.

Now, while this is perfectly feasible with some portions of the body, say the hand, leg, or arm, and therefore perfect shadow pictures of these parts are obtained, it is not always so with the teeth, from the nature of their position, and therefore such perfect results are not always obtainable in our special department. It is possible usually to place the properly cut photograph plate or film on a plane with the lower molars and bicuspids, and sometimes with the upper molars, especially when the vault is high; and under these conditions splendid results are obtained. But when it comes to the teeth anterior to these the horizontal curvature of the maxillary bones, added to the arch of the roof of the mouth in the upper jaw, render this impossible, and consequently in these instances pictures more or less distorted are the best that can be obtained.

As before stated, one of the requirements in obtaining a skiagraph is that the object to be pictured and the plate or film must be held perfectly still during the process. It is frequently possible to cut the film of the proper shape, inclose it in a black (light proof) envelope, and allow the patient to hold it in the mouth in the desired position; but upon general principles this is not satisfactory, more especially with children, as it is liable to be moved during the exposure.

The method that I now use, after much experimenting in that line, is as follows:

A cast is made of the portion of the mouth to be skiagraphed, and a small piece of modeling compound molded over the crowns of the teeth thereon. A piece of aluminum, this metal being almost transparent to the rays, of about 26 or 28 gauge, is cut to the desired size and shape and bent to fit the cast as well as possible. This is slotted along the edge toward the crowns of the teeth, and thereby attached to the modeling compound above referred to. This forms a convenient little film holder, which when placed in the mouth will allow the patient to close the teeth upon it, and thus hold it securely in position, without danger of its moving, for a much longer time than is necessary to take the picture.

The next step is to cut the plate or celluloid film, whichever is to be used, to the proper size and envelop it neatly in black paper, glueing down all the edges with paste and securing it to the plate holder by two or more small aluminum clamps.

This is all that is usually necessary, but if it is deemed advisable to protect this from moisture, as sometimes is the case, more especially for lower teeth, then the black envelope is covered with thin tin foil or waterproof paper neatly pasted down, care being taken not to have the foil, if that is used, doubled upon the side to be exposed. While this may appear to be a long process, it is quickly accomplished, and the invariably satisfactory results obtained warrant the trouble taken.

The patient is then seated in a chair with a photographer's head-rest to hold the head, the Tesla screen, to be described later, put in place, the tube brought to about ten or twelve inches from the face and placed so as to throw the best shadow of the parts upon the film. The length of exposure depends upon the thickness of the parts to be penetrated, the working condition of the apparatus, and the distance of the patient from the tube, the time being proportional to the square of the distance.

From sixty to ninety seconds are necessary for ordinary cases, ranging perhaps up to one hundred and twenty seconds for third molars in heavy jaws, while twenty to forty seconds are sufficient for some favorable cases in thinner bones.

FIG. 14.

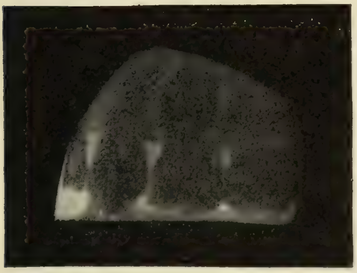


FIG. 15.

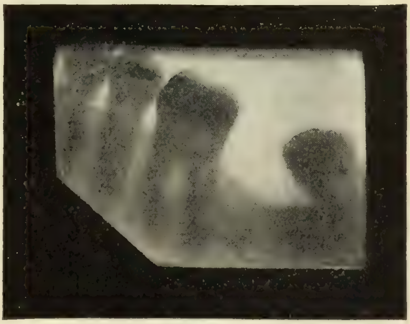


FIG. 16.

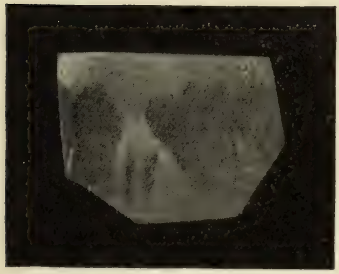


FIG. 17.

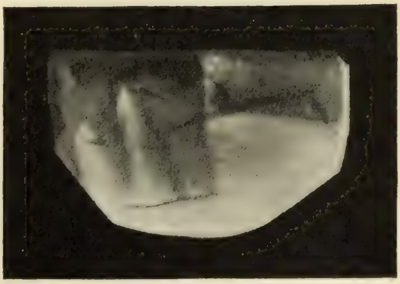


Fig. 14 shows a case in practice of an unerupted bicuspid taken in forty seconds. Fig. 15 shows a case of normal teeth taken in twenty seconds, and Figs. 16 to 22 show cases in practice.

We must bear in mind that obtaining a skiagraph of the teeth is particularly difficult, because we are seeking to obtain shadows of the roots, which are only slightly more opaque to the rays than the bone in which they are found. Herein lies the difficulty; not in obtaining rays that will penetrate the bone, but in the fact that in relatively thick bony tissue the slightly more opaque root, especially toward its attenuated apex, is lost in its dense surroundings, so that for this reason it is sometimes impossible to obtain satisfactory pictures of the ends of the roots we are seeking. Again, for these reasons, the results obtained may at times be very faint and difficult to determine, but even under these circumstances they may be of very great benefit.

FIG. 18.

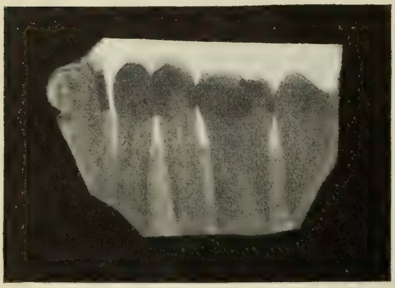


FIG. 19.

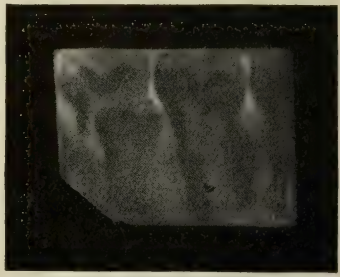


FIG. 20.

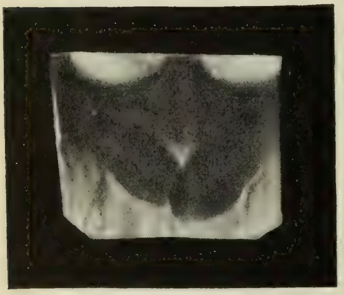


FIG. 21.

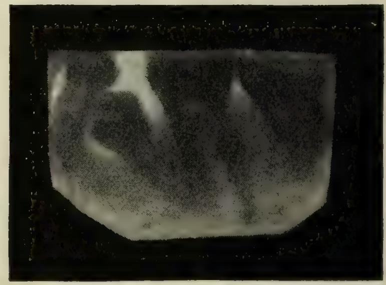
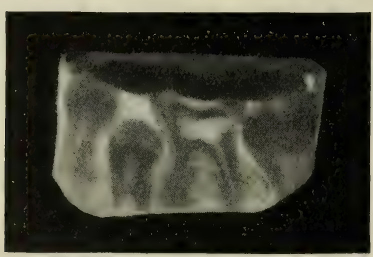


FIG. 22.



As the rays penetrate the celluloid films or glass plates with but little loss of power, several may be superimposed, the one upon the other, and thus two or more pictures obtained at the same time.

Bromide paper may also be used for this purpose instead of the photographic plate or film, but it is not usually as advantageous.

Much has been written and heard of burns or loss of hair being caused subjects who were exposed to these rays. This was probably due to the long exposures to which patients were subjected, sometimes a person being kept under its influence from two to four hours for the purpose of obtaining a skiagraph of the hip or abdomen. Of late, however, we do not hear so much of these bad effects, and, personally, I have never had any in my experience.

The probable cause of this trouble is still a matter of conjecture, some claiming that they are infectious sores, being caused by the rays carrying into the skin any infectious matter that might be upon the surface; and, according to this, the free application of soap and water previous to an exposure would prevent any unpleasant results. On the other hand, Mr. Tesla and others believe it is caused by static electricity, and he proposed the use of an aluminum screen between the tube and the subject, with this screen grounded. In this manner the injurious static discharge is collected upon the metal screen and diverted to the ground, while the Roentgen rays pass through with imperceptible interference.

Not having had any experience with these injurious effects, I am consequently unable to form an opinion upon the subject, considering it a wise precaution, however, to see that the exposed surfaces are clean, and to also use the Tesla screen.

RECENT ADVANCES IN THERAPEUTICS.

BY A. W. HARLAN, M.D., D.D.S., CHICAGO, ILL.

(Read before the National Dental Association, August 1, 1899.)

WHILE there is great activity in every department of dental science and practice, there is no one department where greater or more rapid strides are being made than in therapeutics. All of our ingenuity and skill may be spent in the so-called practical direction, but the application of remedies for the cure of disease is also a part of handicraft, and it keeps pace with the march of progress. Much of the learning and knowledge of drugs is first acquired in the bacteriological laboratory, but more of it is acquired in the empirical use of drugs on man and animals. Such is the restlessness of this age that we are not content to await the slow methods of experimentation, but we must use all new agencies in those fields where better methods are needed, or where we expect quick results. Hence it is that we oftentimes know that a drug will, when applied to an abnormal condition, external or internal, produce certain results without being able to ascertain or explain its exact mode of action. When we do know, it seems so simple that we wonder we did not discover it before. Take the action of trichloracetic acid, for instance, when it is applied to a concretion on the root of a tooth; at first it permeates it, corrodes it, destroys the animal matter which holds it together by attracting the lime or other inorganic matter; then it burns, chars, and incinerates the mass until it crumbles and loses its attachment for the root. The action is both chemical and destructive, and the root is freed of its deposits.

Uric Acid.—In a consideration of the etiology of the so-called pyorrhea alveolaris, many authors have contended that the concretions on the roots of the teeth have their principal origin in the excess of uric acid to be found in the human organism. In a recent paper called "Uric Acid Theories" A. C. Crottan, M.D., of Pasadena, Cal., says, "We maintain:

"1. That uric acid is not the *materies morbi* in uric acid lesions.

"2. That uric acid acts pathologically only from its tendency to form concretions.

"3. That its formation, far from being a process of auto-intoxication, is a process of disintoxication.

"4. That the decrease in the excretion of uric acid observed in some morbid conditions is not due to retention, but to non-formation.

"5. That the *materia peccans* in uric acid lesions are the alloxuric bases.

"6. That in all so-called uric acid lesions we find an absolute increase over the normal of the sum of uric acid and alloxuric bases, and that this finding is of diagnostic value.

"That uric acid is a non-toxic substance has already been emphasized; it is furthermore almost insoluble in the tissue juices,—its salts are essentially insoluble. Not so the alloxuric bases; they are readily soluble, and possess highly toxic properties.

"Therapeutics: The hereditary taint exists; the general rules that empiricism has taught us as to mode of life stand with only those limitations that we must impose on all deductions we draw from empiricism. But in the fully-developed condition in lithemia, gravel, the onset of gout, we have measures at our disposal that counteract; we can exercise an intelligent prophylaxis and possibly effect a cure in many instances if we will follow the rational precepts that a recognition of the above theories dictates. Two indications obtain, a reduction in nuclein-katabolism and a raising of the processes of oxygenation.

"To attain the first object everything should be avoided that will produce a leucocytosis,—viz, a number of drugs should never be administered . . . and certain articles of diet that we know produce leucocytosis, notably proteids, should be reduced. Nuclein-containing foods, such as internal organs, yolk of egg, are bad. Overeating is bad. Let it suffice to outline these points. In a true uric acid case there will be excessive nuclein-katabolism, despite all we may be able to do, in the very nature of the taint, and restrictions in diet will not be of any permanent benefit; the chief point of attack will be in the direction of raising oxidation, and it is here that I have had the good results that I previously mentioned. A uric case should be treated as an anemic case in all measures employed to promote the oxygenation powers of the blood,—*i.e.*, the production of an increase in the red blood-corpuscles and all the hemoglobin and its chief oxygen carrier, iron. I administer iron in the forms and on the same rational principles that I would administer it to a chlorotic patient; arsenic is usually combined with it. I need not mention the many medical measures at our disposal to attain the above goal, nor the hygienic measures that will promote aëration of the blood; neither is this the place to critically discuss the merits or demerits of alkalies, salicylates, etc., and their efficiency as solvents and eliminators of poisonous products. The most striking results have been obtained in acute cases by inhalations of oxygen gas. On six occasions I did 'cut' an attack of gout by giving the patient inhalations of oxygen repeated at short intervals. I can invariably relieve, if not cure, a uric acid headache, a migraine, in short, lithemic attacks, by oxygen inhalations. The benefits derived from the procedure are surprising and most gratifying, and the relief to the patient almost instantaneous. What oxygen will do in uremia, which in my view is due to alloxuric base poisoning, not to uric acid poisoning, I have not been able to try as yet. I have a record to-day of only twenty-two cases in which results were so positive that they merit chronicling. My clinical facilities are limited, and it is for that reason and in order to know as soon as possible whether the principles I advocate, when more widely applied, will merit universal acceptance I request my patient readers to send me short reports of cases on whom they may consider it worth while to try oxygen inhalations. It would be a boon, indeed, to humanity if in so simple procedures as are advised a cure could be found for one of the most widespread scourges of over-civilization."

Liquid Air.—So many articles have appeared on liquid air in the popular magazines that we are not surprised to find that the *Medical Record* of July 22 has such an article from the pen of A. C. White, M.D., from the surgical standpoint. I will quote from this paper on the efficacy of liquid air in the treatment of ulcers, for the opening of abscesses, and as a local anesthetic. (Professor Chas. E. Tripler, of New York, has for some time been able to furnish liquid air for popular use, and is now supplying it in small quantities to members of the medical profession. Its temperature is 312° F. below zero. No special precautions are to be taken in its transportation, as it may be carried in a tin can placed within another can lined with felt.) "In using liquid air as a local anesthetic, I believe it better to apply it intermittently while the operator is working than to try to freeze the part so that it will remain senseless for any length of time. This intermittent use of the spray would not be necessary when a simple incision was required, as in the case of opening an abscess.

"I first began the use of liquid air in the local treatment of ulcers of the leg, chiefly varicose, many chancroids, and some specific ulcers. So many of these cases have now been treated with liquid air that it can be said with positiveness that we have nothing at our disposal to-day which will so quickly, thoroughly, and with so little pain clear up the edges and stimulate the surface of an ulcer to granulations as liquid air does when properly applied. The application should not be made so frequently as to break down the new granulations as they form. After the first two applications to a varicose ulcer, one application a week is usually sufficient. To a chancroid or mixed sore one application pretty generously applied is sufficient. A 'beefsteak' chancre requires two or three applications three or four days apart. All ulcerations treated with liquid air seem to do better when followed by a dry dressing, such as aristol, subgallate of bismuth, or stearate of zinc, instead of any unguent.

"An abscess, boil, carbuncle, or bubo in the early stage is aborted absolutely with one thorough freezing. If it is more advanced, several applications at intervals of twenty-four hours are necessary. Whenever pus has formed in large quantity it is advisable to anesthetize with liquid air, incise, and evacuate. In cases of bubo and carbuncle well advanced, it is unnecessary to curette if the liquid air is applied generously to the base of the abscess after incision. In all these cases the pain is instantly relieved after the application of liquid air. No sloughing follows excepting in the case of fairly well advanced carbuncles, and in some of the abscesses when the overlying skin has become devitalized from tension and inflammation. In these cases the slough is only superficial, and the ulcer left readily heals.

"In a number of cases of sciatica and of herpes zoster, one case of intercostal neuralgia, and one of facial neuralgia, liquid air has been tried. In every one of these cases instant and, so far as we are able to judge at the present time, permanent relief has been obtained by applying the liquid to the spinal end of the affected nerve. In one case of sciatica the air was applied to several points in the course of the nerve. In two cases of herpes zoster (all were situated on the chest wall) the eruption had completely dried up three days after application, and in the other cases about five days were required. In none of these nerve cases was the air applied more than once, and in no case was the application severe enough to cause blistering or sloughing.

"Two cases of facial erysipelas were treated; not with a spray or swab, on account of the extent of surface involved, but by rolling a glass bulb filled with liquid air over the tissues involved. The surface temperature, the inflammation, and pain subsided at once; but it was impossible to get any subsequent history of the cases, so that the result of the single treatment is doubtful. I should imagine it would require a number of applications at intervals of several hours to accomplish much good in erysipelas."

Papain.—The concentrated active principle of the juice of the unripe fruit of Carica papaya. The juice is concentrated in vacuo, and the ferment is precipitated by the addition of alcohol. Papain forms an amorphous, white, hygroscopic powder, soluble in water and glycerol only. Employed as a digestive ferment, like animal ferments (pepsin), it digests albuminous substances, possessing the advantage of being active in either acid, alkaline, or neutral solutions. Dose, 0.12-0.5 gram (2-8 gr.) after meals. Applied as a five per cent. solution (in equal parts of glycerol and water), it is used to dissolve the false membranes of croup and diphtheria, and it has been used to digest portions of a pulp. This requires from twenty-four to seventy-two hours in most cases. The cavity must be sealed well.

Orthoform.—$C_6H_3(OH)(NH_2)COOCH_3$.

Synonym: Methyl-para-amido-meta-oxybenzoate.

Occurs as a white, voluminous, odorless, and tasteless powder.

It is permanent and non-hygroscopic, and slightly soluble in water. Used as an antiseptic and local anesthetic to relieve the pain of wounds, ulcers, burns, excoriations, etc. Being absolutely non-toxic, it may be applied to large surfaces in any quantity; as ointment it is used to the extent of ten to twenty per cent. made up with lanolin. Dose, 0.5-1.0 gram (8-15 gr.) in affections of the gastric mucous membranes. Orthoform hydrochlorid forms a soluble crystalline salt, and, although it anesthetizes as well as orthoform, it is not generally applicable for subcutaneous injection. (D. R. P. Hoechst.)

Orthoform, New.—Under the name of the new orthoform (orthoform new) the Hoechst Color Works has put on the market meta-amido-para-oxybenzoic-methyl ester, while the original orthoform is para-amido-meta-oxybenzoic-methyl ester. The new preparation is whiter and cheaper than the original article. It is used in the same way as the original orthoform. It is perfectly non-irritating, even when applied in full strength.

Silver Sulfo-Carbolate.—Synonym: Silver sulfo-phenate. An antiseptic used like itrol and argonin, in eye-diseases and wounds. It occurs in white, prismatic needles, containing twenty-eight per cent. of silver. Prepared from silver carbonate and sulfo-carbolic acid. The preparation must be protected from the light and air, otherwise it is liable to split up into metallic silver and phenol. It is said to possess good antiseptic properties, and to be preferable to silver nitrate, owing to its non-corrosive action. It acts very well in deep pyorrhea pockets; it is soluble in water in three to ten per cent. solutions.

Actol.—$AgC_3H_5O_3$-H_2O. (Silver lactate.)

A white, inodorous, and tasteless powder, soluble in water (1 : 20), recommended as a surgical antiseptic. An aqueous solution (1 : 100) destroys within five minutes all pathogenic microbes. As a hypodermic injection in erysipelas, 0.3 gram to 100 cc. of water; as a wash, a teaspoonful of the solution (1 : 50) to a glass of water. I have used silver lactate in suppurating pockets on the sides of roots of teeth with excellent results. It will stain the cementum, but these stains are as easily removed as those from silver nitrate. It does not cause pain when used up to twenty per cent.

THE PHYSIOLOGICAL RELATION OF THE DENTAL PULP TO THE ECONOMY.

BY CHARLES L. HUNGERFORD, D.D.S., KANSAS CITY, MO.

(Read before the National Dental Association, August 1, 1899.)

THE age is one of analysis; it is to be hoped that the future will be one of synthesis. The deductive method of analysis must of necessity be faulty, since few men would have the assurance to believe that they were acquainted with all the facts tending toward any given result; therefore, if we can approximate the Platonic method, commencing with generalities, it is possible that we may arrive at more accurate conclusions. I have therefore sought to bring a few generalities into this question which to some may seem to have no bearing on the subject, yet, if a part partakes of the nature of the whole, will, I hope, not be deemed entirely irrelevant.

It is my desire to show that originally the dental pulp was a constructive organ, temporarily associated with the economy for the purpose of forming dentin, which has no such association; its function completed, nature tries to pass it on into other forms, for in nature there is no such thing as standing still. This constant pulsating energy in its various forms is either constructive or destructive, producing growth or decay; when there is decay there is a giving to other forms, or a resolving back into the great storehouse of nature. There is no disassociating these two great aspects of the life force of the universe; the moment growth ceases decay commences, which is the evolvement of more perfect forms.

If I can show this to be true it will be good presumptive evidence that the destruction of the dental pulp will be always permissible whenever it stands in the way of any operation to supply lost teeth, or to preserve or beautify those that remain.

While I believe in the absolute interdependence of everything in the universe, I do not believe that this dependence is restricted to eternally doing the same thing, which would mean an end to all progress and an eternal stagnation.

Every entity, cell, organ, or plant serves its place in the great economy. Like stones wedged within a wall, they bear down as much as they bear up; and as no man has yet succeeded in lifting himself off the earth by pulling on his boot-straps, so no evolution is complete that does not work with outstretched hands, one grasping something lower, the other holding on to something higher and more advanced than itself; it dare not let go of either or it would lose its place in that chain which can have no gap or missing link, and which is the only basis of a rational evolution.

"As above so below," said the thrice wise Hermes, and man, the epitome of the universe, proves the truth of the axiom. With every meal that we eat we are schooling ten million times ten million cells to a better performance of their functions; with every grouping of these cells into glands and organs there is a synthetic effort upon the part of these cells to become conscious entities in the conscious universe that they momentarily inhabit,—man's body; their life work done in any particular locality, they pass on to more perfect forms in other bodies.

The universality of this proposition holds good, whether applied to the animal, vegetable, or mineral kingdoms, but it becomes especially apparent in the functioning of the various tissues in man's body; they give up their form, which is their life, that he may live, —a trite truth, but seemingly of little profit in this day.

I do not propose to go into the so-called histology and physiology of tooth-structure, for what avails it to carry "coals to Newcastle?" You are all better acquainted with this subject than I, but if I can show that the carbonizing process does not commence at Newcastle, nor will it end there, it may prevent some more timid brother from hastening that other carbonizing process within the body of human dentin while vainly imagining he is doing quite the reverse.

I would like to have cited the remarks of Dr. E. C. Briggs before the New York Institute of Stomatology, as reported in last month's *International Dental Journal,* they so thoroughly accord with my own views on this subject; but I know how easy it is to be influenced by great names, and how few are scholarly enough to hold decision in reserve until by personal experience and observation they can even commence to judge of the worth or expediency of any operation.

If we pause to think of it, there is a great similarity between the birth of a world, a man, or a tooth; force and substance being the universal father and mother of all that is, each has its three kingdoms separate and distinct from each other, though one in their origin and purpose. As soon as differentiation begins functionings change; thus we see while a tooth is distinctly a dermal product, it is differentiation of that derma that gives rise to the three membranes that produce enamel, dentin, and cement, each of which grows at the expense of the organ from which it derived its origin, and maintains its existence independently of that organ in exact ratio to that organ's maintaining or losing its original functions.

The entire enamel-membrane is used up by the forming enamel, the dentin still connected by that silver thread that waxes less with each succeeding year; the dentin itself serving no other purpose than a go-between, supporting the enamel shield on the outside and connecting it to the more vital cement underneath, but physiologically wholly independent of either.

Just as the soul in man stands midway between the body and spirit, the mediator and support of both, an entity whose placenta is lost in the womb of time, so that other placenta connecting the dentin with the body is striving to return to its parent source, and he best conserves the economy of nature who puts the fewest obstructions in her way when her hour has come.

Cut off the crown of the tooth, bore out the dentin to the very apex, that mere animal body, the cement, still lives and thrives as well, yes, better, than it did before, for that force that prolonged an existence, its life work done, has now gone to strengthen an active functioning tissue; I mean the periosteum. Indeed, so much is this the case that among skillful dentists the first procedure in treating a bad case of pyorrhea is the destruction of the pulps of the teeth involved.

With our present knowledge there never was, never will be, but one successful argument against pulp removal, and that is our inability to entirely remove it and fill the space. I have heard many objections to this operation, but this is the only one that seems to me to be of any force.

I have heard it said that nature knows what she is about, and if she did not want a tooth-pulp she would never have made one. Nature is a fine scapegoat upon whom to cast the results of our folly or our ignorance. Nature has nothing to do with it. A blind force following the behests of man, her master, whether he builds well or ill, consciously or unconsciously, nature takes no account of our ignorance or our wisdom, she bows only to commands.

A few there are whose mental furnishings consist of what Dr. So and So says, but they do not count. Out on the professional man who accepts unreservedly the opinions of others! Let us keep our own individuality and think for ourselves, though we do it in spite of that syndicate called public opinion.

For myself, I am looking for the truth, and stand ready to renounce all I have ever heard or thought when facts stare me in the face; and these three facts appeal to me as the result of some years of experience: First, that a human tooth does not depend for its physiological relationship with the economy on either the dentin or the enamel, for neither comes in contact with that economy; and after the removal of the dentin, enamel, and pulp there is no impairment of the functions of the remaining dental tissues,—viz, cement, periosteum, and alveolar process; whereas if these tissues were interdependent in the same way as the glandular system, the destruction of one would mean the impairment of all.

The blood-supply to the vascular and pulmonary systems is a fair illustration of this principle; even true bone is not seriously impaired by the destruction of its medullary arteries and nerves.

Second, that the dental follicle having grown enough dentin to give stability, has performed all the physiological function of which it is capable, for any further functioning of the remains of this follicle after the typal limits of the dentin are reached is of an abnormal character, as shown by microscopic examination of secondary dentin, pulp-nodules, etc.; and such further functioning is followed by disintegration and pain.

It therefore follows that the physiological relationship of the adult dental pulp to the economy is solely for its own maintenance, and that organ, tissue, or man who lives solely for himself has completed his life's work, loses his place in the evolutionary chain, and nature spews him out of her mouth.

Third, I have never heard the destruction of the dental pulp decried by any one who could successfully perform the operation. I have also noted that dentists or physicians who resort to chemicals to accomplish surgical procedures succeed in deluding no one but themselves. Like the other class who, believing that complicated nomenclature is *prima facie* evidence of a liberal profession, and that protracted college terms can take the place of brains, will find out in the end that they have filled up a profession they should protect and love with a set of nincompoops, whose only contribution to the great needs of humanity has been their college fees; for few really able fellows will care to spend years in garnishing a liberal education, the *sine qua non* of a professional man, with the trappings of any specialty.

It is with much difficulty that I have succeeded in padding my epigram beyond the limits of a paragraph, but if I have not completely hidden it in the chaff you may burn the chaff, providing you are willing to make of it a torch for the truth.

PHYSIOLOGICAL REASONS FOR SUPPOSING THAT DENTIN AND ENAMEL IN PULPLESS TEETH MAY BE NOURISHED.

BY JOSEPH HEAD, M.D., D.D.S., PHILADELPHIA, PA.

(Read before the National Dental Association, August 1, 1899.)

THE case I wish to present for the consideration of the learned gentlemen present is that of a young lady whose slightest systemic derangement was often followed by obstinate pulp-congestion.

On the 30th day of March, 1897, she came to me with such congestion in the pulp of the left upper first permanent molar as made it necessary to remove the pulp. Bleeding and arsenical applications were uselessly tried; cataphoresis was found unavailing against such tissue, and finally cocain was injected and the pulp thoroughly removed up to the tip of each root by means of a Donaldson nerve-broach.

The canals were filled with oxychlorid of zinc June 6, three months and six days after the trouble began; but in the mean time the first and second upper bicuspids on the same side gave such trouble that their pulps had also to be removed. Thus by June 15 the pulps of the left upper first permanent molar and left upper first and second bicuspids had been removed, and all the canals were filled with oxychlorid of zinc. The patient was then dismissed.

In the following December she returned with a congested pulp in the left lower third molar, and, in the light of past experience, the tooth was extracted. The relief was, however, but temporary, and on the following day she again returned, declaring that hot and cold water gave her unbearable pain. I examined all of the teeth containing living pulps, and, as none responded to the tests, I finally in desperation began to test all of the teeth; and with most startling results. For when a hot instrument was placed against the molar from which I had extracted the pulp six months previously, the pain was intense. The pulpless first and second bicuspids also responded, but to a less degree.

On opening the first permanent molar I found that the oxychlorid of zinc filling had become liquefied, and that the entire dentin had taken on such inflammation that it could not be touched without causing the patient to turn pale. In the bicuspids the oxychlorid of zinc was hard and normal.

In previous years I had noted cases where dentin was sensitive in spots after a pulp had been newly extracted, and I attributed this sensibility to possible prolongations of the protoplasmic material of the cementum, but in the case just quoted the sensibility of the dentin was general, and the pain was quite as intense as if a live pulp had been distributing nerve-tissue and nourishment. All three teeth were reopened thoroughly, and daily applications of chlorid of zinc were made until the sensibility was brought under control, when they were again filled. Six months later the teeth were still sensitive to heat and cold, but up to the present time the sensibility has steadily diminished and the patient has finally had entire relief. One fact concerning this report should be especially emphasized. The pulp was removed from a molar May 22, 1897, and for over one year and a half the dentin remained sensitive and presumably alive. Thus by a sort of human vivisection we have conclusive proof that dentin has means of sensitory communication and avenues of nourishment independent of the pulp.

As Dr. Williams ably stated in his paper, published in the March DENTAL COSMOS, "Facts should make theories, not theories facts," and whether science has or has not been able to discover the means of pulpless dentin nourishment and nerve supply, the above recorded clinical phenomena simply prove that the microscope in this case has been defective. But are these phenomena incapable of being satisfactorily explained by facts already well known? Let us see.

The ultimate nutrition of all the cells in the body is performed by osmosis of the liquor sanguinis, which weeps through the thin walls of the capillaries. The tooth has two avenues of nourishment, the pulp and the cementum. The pulp opens primarily into the dentinal tubules, but beyond the dentinal tubules the liquor sanguinis in nourishing the tooth-substance must permeate by osmosis pure and simple.

The cementum communicates with the intertubular spaces and dentinal tubules of the dentin by means of its lacunæ, and osmosis can take place through it to all parts of the tooth, just as osmosis from the pulp occurs; while the avenues in the cementum not being so large as those of the pulp, the process must be slower and less effective.

Thus the apparent puzzle seems to be solved. There being but two means of blood-supply,—namely, the pulp and the cementum,—each using the process of osmosis for ultimate nourishment, it is clear that if the pulp be destroyed the cementum must undertake the work formerly performed by both; and that it does do this seems to be emphasized by the fact that the cementum tends to exostosis and thickening when the pulp is gone, as though making preparation for extra effort.

If it be said in refutation that nerve communication between the dentin and the cementum has never been found by the microscope, it may be answered that the microscope has probably not yet found the half of what it is destined to find, and that it is far easier to believe that the microscope has overlooked minute sensitory plasma than to believe that sensitory impulses between the dentin and gum are carried on by a system kindred to the Marconi system. And, furthermore, since the dentin can be nourished by a process similar to osmosis, why cannot the enamel be nourished in a similar way? Why should not the phosphate of calcium or some kindred salt percolating through the tooth gradually modify the density of the enamel-rods or their sheaths? My daily excavations tell me unmistakably that the enamel of five years is less hard than the enamel of forty years; my daily observations make me feel that the enamel grows harder in course of years long after the enamel-organ has been destroyed. But whether this hardening is done, as I think, by a further calcification of the rod sheaths, or whether the hardening is due to a change entirely within the enamel molecule, just as the carbon of coal is the same as the carbon of the diamond, I do not presume to affirm.

I only know that since pulpless dentin has been observed to live and have sensation for over a year, such pulpless dentin must have nerve supply and nourishment independent of the pulp. And if nutrition is possible to the dentin by osmosis through the cementum lacunæ, it is equally possible to the enamel by the same means; and when we consider how frequently enamel is known to change its color from permeation by blood plasma charged with broken-down hemoglobin, not only the possibility, but the probability, of enamel nutrition by osmosis is forced upon our consideration.

COUNTER-IRRITATION.

BY W. E. GRISWOLD, D.D.S., DENVER, COL.

(Read before the National Dental Association, August 1, 1899.)

ONE principle of homeopathy applied in allopathy, "Like cures like," or counter-irritation, is defined as a superficial and artificially produced inflammation, in order to exercise a good effect upon some adjacent part or deep-seated morbid process. As applied in our specialty, it generally consists in the application to the mucous membrane of rubefacients, which are mainly useful in the early stage of the acute or chronic form of inflammation. Their action is to relieve tension in the blood-vessels by dilating the capillaries and diverting the blood current from the inflamed area; also causing reflex contraction of the blood-vessels, thus diminishing the supply. They should be applied at a point more or less remote, lest the congestion be increased rather than diminished, unless used to promote reabsorption of inflammatory products.

This is a therapeutic measure as old as the art of medicine itself, and has stood the test of time and trial far better than most of its contemporaries, for the scientific tendencies of modern medicine have served to discredit many of them; but these same tests, when applied to counter-irritation, have only tended to confirm the good opinion empirically earned for it by demonstrating a scientific and rational explanation for its efficiency.

As there is only a certain amount of blood in the body, the determination or deflection of an unusual proportion of it to a certain part or to the surface of the body must necessarily reduce the amount elsewhere in the tissues. In this way a pneumonitis may be favorably influenced by dry heat or poultices applied to the surface, or by a hot mustard bath to the extremities.

Acute internal inflammations have been treated this way for ages, and it cannot be denied that such treatment has been beneficial in its effects, both in its modification of the inflammatory process and in the relief of pain and distress. But there is another and far more important factor in the *modus operandi* of effective counter-irritation. I allude to the influence brought to bear through the nervous system. It is now known that certain sensations, painful or not, are carried along certain nerves, and that the sensitive point may be at a distance from the point where the irritation or inflammation is seated. Sometimes this painful sensation is carried from an organ in which it originated to the brain or spinal cord, and there transmitted along other sensory nerves to a part that is quite remote. This is illustrated by the right shoulder pain of certain diseases of the liver, and the left arm pain of angina pectoris; it is also shown in the intercommunication of nervous impressions from the uterus to the breasts in women, and by all the alterations in nutrition which may occur in one part through a profound effect made on a remote one, as in the ulcerations of the intestines that follow extensive burns on the surface of the abdomen. Perhaps the most clearly marked example of what is known as generalization of symptoms from a local focus of irritation in the mouth is that presented by a child in convulsions from painful dentition. Symptoms quite as well marked and as clearly traceable to irritation in the oral cavity may often be found in adults, though the connection may not, on the face of things, be so apparent, and much careful investigation is often necessary to establish the relation of cause and effect.

Instances of this kind may be presented by impacted third molars, congested pulps, forming abscesses, and the train of the reflected and referred pains that go with these conditions, or even a condition of more or less profound nervous exhaustion or hysteria may originate in the same manner.

The idea I would convey is this: That this system of medication would be more effective in our hands if its reflex action was more carefully looked into and medicaments applied along the lines of transmission of pain, or remote parts, and by so doing get a reflex action in the other direction with relief of symptoms.

In the relief of congestion in the mouth a counter-irritant may be applied to the mucous membrane or behind the ear, the nape of the neck, to the feet, or over the whole surface of the body, as indicated. Thus the range of remedies may extend from the use of a plaster or lotion on the gums to a mustard foot-bath or a hot body-bath, which may be brought to bear on the large superficial surfaces; and it is a question in my mind whether such systemic medication as cathartics, diaphoretics, diuretics, etc., might not be considered counter-irritants, inasmuch as they tend to the same result,—relief of congestion in remote parts.

CORRESPONDENCE.

LETTER FROM DR. FLAGG.

TO THE EDITOR OF THE DENTAL COSMOS:

Sir,—I desire to call special attention to the *first seven paragraphs* found on page 635 of the July DENTAL COSMOS, embodied in the article headed "Cataphoresis." Not that I would occupy a line of your space in antagonizing that process as adjunctive to the practice of those who find it *satisfactory,* but I do desire that presentation of its claims shall not be regarded as worthy of attention if based upon such peculiar views and couched in such derogatory and most decidedly inadmissible language.

While, as stated in the first paragraph, we do see many reports of successful reducing of sensitiveness of dentin by cataphoresis, as I view it, they are all made with a concomitant expenditure of time which is utterly unnecessary, and which seems to me to make the reference to "conscientious" operators, found in the second paragraph, a rather questionable appellation.

I do not see exactly what the conscientiousness of an operator has to do with the obtunding of sensitivity of dentin any more than with *everything* in the work of dentistry, and the enunciation that "there is no one difficulty so troublesome to overcome" as even the *extreme* of this condition is to me a startling evidence of retrograde, rather than progress, in the practice of our profession.

This paragraph concludes with the continued connection between conscience and sensitivity, but it is the evident leading to that which I hold to be entirely unwarranted in its misrepresentation to which I most earnestly object.

I quote the third, fourth, and fifth paragraphs entire, that my comments may be the more easily and fully understood:

"For those of the profession who have persuaded themselves or have been taught by certain 'false prophets' that it is not necessary to thoroughly remove decay from cavities, sensitiveness of dentin presents a much smaller obstacle.

"The man who is content, as many seem to be, to half clean the cavities presented, and plaster them up with cement, has much less need of any obtunding process.

"Consequently, this portion of the profession is not much benefited by cataphoresis."

It would seem, from the diction of these sentences, that they were beneath criticism, but the evident ignorance of the discussions and final trends toward settlements of thirty to forty years ago, together with the unkind and, as I think, reprehensible indicting of those who have been both teaching and practicing the non-removal of decayed dentin from cavities when in their *knowledge* and *experience* it has been not only a proper practice to so do, but one eminently productive of the most desirable results, renders it, with me, necessary.

To suppose that the sensitivity or non-sensitivity of the decayed dentin has *anything* to do with its removal or non-removal in the preparation of a cavity for filling is vastly more "novel" in its way than was the proposition to discuss the possible "benefit to the profession" of cataphoresis, for any question, or even mention, of sensitivity in connection with "non-removal of decay" has never, to my knowledge, *until now* been made.

That the *non-removal of decay,* which at every cut of excavator or bur, or at even the *slightest touch,* enters its protest in no unmistakable terms at the infliction, is any objection to this practice I fail to appreciate, but the idea that it is ever left *because* of sensitivity, or that it is removed *because* of non-sensitivity, is simply erroneous, though we must not forget that every one in Rhode Island has always been privileged to enjoy his own belief.

But, again, as Rhode Island is my native state, I also claim the right to my belief, which is that the complete removal of decay from cavities preparatory to filling them is at times not only not indicated, but is positively such malpractice as no properly educated and experienced practitioner could possibly indulge in.

More than fifty years ago Dr. Robert Arthur *demonstrated* the value of this practice; taught it as professor of dental pathology and therapeutics in the Philadelphia College of Dental Surgery; imbued some members of his classes with the truth of his teachings, and thus established a method from which to-day tens of thousands of teeth are enjoying full vitality which would have been rendered sooner or later pulpless from the complete removal of living *decayed* dentin.

Both Professor Robert Arthur and those who have followed in the educational work of continuing his teaching in this regard have prophesied good results as largely accruing from this practice, and I for one indignantly repel the statement that we have been "false prophets."

That is a nasty name to call any one; it is, however, a name of reproach which, if warranted, is deservedly bestowed, but when it is undeservedly and wrongfully given to those who have taught and demonstrated the value of this humane and beneficent practice for almost half a century, and to the glorious end that there are hundreds of dentists who are thus saving the full vitality of thousands of the teeth of their patients, and this with an enormous amount of concomitant exemption from suffering, it seems to me an aspersion which cannot be too strongly rebuked, and the more so when both teachers and practitioners of this practice are combinedly consigned *in bulk* to the class of either ignorant or *non-conscientious* operators. J. FOSTER FLAGG, D.D.S.

CAVITY MEASUREMENTS.

TO THE EDITOR OF THE DENTAL COSMOS:

Sir,—On page 874 of the September, 1899, DENTAL COSMOS, in an article contributed by Dr. Laurence P. Leonard, of Waseca, Minn., on the subject of "Thoughts on Measuring and Preparing Approximo-Occlusal Cavities in Bicuspids and Molars," occurs this statement: "In July, 1897, the essayist read a paper before the Pacific Coast Dental Society in which he gave this same rule, or two-thirds average. The article was published in the *Stomatological Gazette*, of San Francisco, in October of the same year. The December DENTAL COSMOS contains an article by another dentist arriving at the same two-thirds rule, entirely unconscious of my previous finding. This is a coincidence of more than passing importance, as it shows that the disciples of Dr. Black find it necessary to 'extend for prevention' their cavities two-thirds bucco-lingually the width of the tooth. If Drs. Black, Johnson, and other scientific men would give us their cavity measurements they too would undoubtedly corroborate the same two-thirds rule." I desire to call the attention of the readers of the DENTAL COSMOS to the above statement, to two articles of mine, one in the May (1897) DENTAL COSMOS, the other in the December (1897) DENTAL COSMOS; also to the *Stomatological Gazette* of October, 1897, and especially to the discussion of Dr. Leonard's paper. Something is said in this discussion by the good men of California regarding the researches I had made in the past relative to the system of measurement.

Between October, 1895, and June, 1897, I was continually experimenting with the system of measurement for the purpose of obtaining some absolute data for my studies of teeth, cavities, etc. The work along this line is still being continued, and it can only be concluded when I stop preparing cavities. In April, 1897, by making a comparison of the old with the new records of cavity measurement, I discovered that the average width of the approximal cavities in incisors, cuspids, bicuspids, and molars which I was then preparing equaled two-thirds of the thickness that the tooth measured linguo-buccally.

At some time between the 20th and 30th of June, 1897, Dr. Leonard came into my office and said to me, "What is there new in the system of measurement?" My answer was, "I have arrived at some definite conclusions which I recently communicated to Drs. Black and Johnson, and when published you can have them. I desire to obtain credit for the results of my researches." Dr. Leonard said, "I am as honorable as Dr. Black or Dr. Johnson, and I give you my word of honor, if you communicate the results of your work to me I will merely use them in my own practice, and I promise you I will not publish them." After talking awhile with him, the two-thirds rule for the preparation of approximal cavities was communicated by me to Dr. Leonard. Prior to this interview I had talked with Dr. Leonard on several occasions about the experiments I had been making which led up to the two-thirds rule, which latter I communicated to him as just related.

Dr. Leonard violated the confidence reposed in him by announcing the rule as stated in the quotation which begins this letter. This is a plain statement of the facts in the case.

Yours truly,

E. K. WEDELSTAEDT.

NEW YORK LIFE BLDG., ST. PAUL, MINN., Sept. 15, 1899.

ACTION OF BACTERIA ON DENTIN.

TO THE EDITOR OF THE DENTAL COSMOS:

Sir,—Referring to the letter which Dr. Söderberg publishes in the DENTAL COSMOS for August on Arkövy's "Bacillus Gangrænæ Pulpæ," and also to the mention of this organism in the abstract of Dr. Hunter's paper as published in the *International Dental Journal* for August, permit me to say that I have been familiar with

Arkövy's work for some years, and I have had in my desk for several months a partly completed review of his more recent work and that of one of his pupils on oral bacteriology.

I am glad that Dr. Söderberg has called attention to this important work, but I regard the recent investigations of my friend, Mr. Kenneth W. Goadby, of Guy's Hospital, London, as an advance on Arkövy's position with special reference to the destruction of the basis-substance of dentin by bacterial action. The one experiment, and this I believe an accident, on which the opinion is based that decay of dentin may occur without the presence of acids can hardly be regarded by bacteriologists as of much significance. Some teeth were placed in an agar culture of Bacillus gangrænæ pulpæ and put aside in a closet. Sixteen months afterward they were discovered. The cementum was softened and discolored, and the dentin somewhat less so, with the dentinal tubules enlarged. The agar culture, *after having stood for sixteen months,* gave an alkaline reaction. There is nothing surprising about this, as several micro-organisms which are known to be acid-producers would give an alkaline reaction after having stood in a culture-medium for a much shorter time than sixteen months. There is at present no proof forthcoming that the culture was not, at some period of its existence, in an acid condition. But even if it should be demonstrated that any effect resembling caries of dentin can be produced in an alkaline medium, which I very seriously doubt, such a demonstration would not touch my position with reference to caries of enamel.

J. LEON WILLIAMS.

30 GEORGE ST., HANOVER SQUARE, LONDON.

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PROCEEDINGS OF SOCIETIES.

UNION MEETING OF THE DISTRICT OF COLUMBIA DENTAL SOCIETY, MARYLAND STATE DENTAL ASSOCIATION, AND VIRGINIA STATE DENTAL ASSOCIATION.

(Continued from page 933.)

FIRST DAY—*Afternoon Session* (Continued).

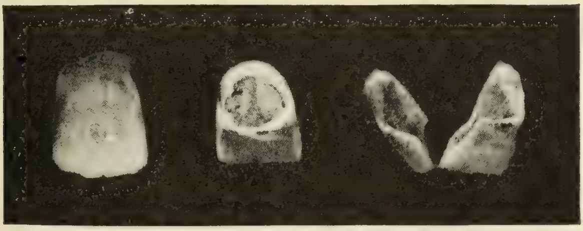
DR. CLARENCE J. GRIEVES, Baltimore, read the following paper:

A CASE OF PROGRESSIVE DENTINAL RESORPTION.

The case presented is considered of value not alone for its rarity,—there have been others reported,—but for the opportunity which offers in the study of the slides obtained, emphasizing again the thought of a high vitalization of the dentinal tissue and its intimate relation with the system generally.

The denture of Mr. S., age twenty-eight, nervo-sanguineous temperament, in perfect health but of sedentary habits, presented during the summer of '94 the following phenomena: A gradually increasing pink spot had appeared in an upper right central incisor which previously was perfectly normal, being free from all dentinal lesions. In ten days the entire crown developed a decided pink hue, no pain attending these symptoms. It was impossible to induce the patient to consent to interference in any way, and on the twelfth day he appeared in great pain with the entire coronal portion fractured from the root and retained in place only by the gingival attachments. Dissection of these tissues from the layer of cementum fractured with the crown allowed it to move away quite freely from the pulpal portion, which filled the entire space previously occupied by dentin and remained attached in the root-canal by its upper portion, which was of the normal size. Great pain attended the operation of removal of this pulp, which unfortunately was so destroyed as to prevent cutting entire sections. The few slides obtained show a lack of pulp characteristics, the largest section presenting nothing but a mass of simple cellular connective tissue. The enlarged photographs (Figs. 1 and 2) show the coronal portion from four different positions, the enamel shell being split quite recently to obtain sections. The only dentin remaining is a slight portion at the incisive edge. Even the enamel-walls have been attacked, presenting much thinner than usual. A pulp-canal of normal caliber opening at the line of the gingival attachments into a healthy root made possible an artificial crown. During the sittings consumed in the construction of this crown an exactly similar train of phenomena occurred in the left central incisor. The resorptive process in this case was intercepted at the end of the fourth day by opening on the palatal wall, devitalizing, and removing pulp, which, though smaller, presented the same appearance as the tissue found in right central. Analysis of the urine during these symptoms gave a slight excess in the phosphates, all other ingredients being normal.

FIG. 1.



a. Labial view. Crown as fractured from root.
b. Cervical end of crown at the fracture line, looking into hollow crown.
c. Palatal view of crown split to show resorption area.

It is interesting to note that the distal approximal surface of this tooth contained a small but successful gold filling placed in 1889, the dentin at that time being even above the average. From the enlarged opening on the palatal wall could be had an excellent view of the inner convex surface of this filling, bright and clean, just as it had been placed five years before, the entire dentinal structure having been removed from around it. The cavity and root-canals of this central were filled with cement, which occupied nearly the entire dentinal space, and the filling completed with gold. The patient had been under my supervision for ten years, five years previous to the time of resorption, during which period his denture was above the average. Five years of patient waiting before reporting this case have, much to the regret of the writer, produced but one point worth noting,—*i.e.* there has occurred double the amount of deep caries with frequent pulp-exposures.

We note the following facts in reference to the diagrams (see Figs. 2, 4, and 5):

First. Resorption extended equally in all directions, enamel and dentin suffering alike, but the enamel in a less degree, the rule being the nearer the pulp the more severe the resorptive action.

Second. Absence of dental lesions of any kind and no history of traumatism would preclude the possibility of exterior causes.

Third. In both cases the process of resorption only ceased with interference with the resorptive tissue,—*i.e.*, the enlarged dental pulp, which on exposure appeared absolutely healthy tissue, apparently free from inflammatory action or purulence.

Fourth. That there was no enlargement of the pulp-chamber in each case above the line of peridental attachments may be explained by the interference with the resorptive processes caused by the fracture of the crown, and the probability of resorptive action from the pulpal side of the root dentin being antagonized by the nutritive supply on the peridental side, no doubt produced by the anastomosis of the cement canaliculi with the fibrillæ of the dentin.

In approaching the subject of dentinal change and degeneration as produced from some central agency we find a well-defined line dividing the profession, as reflected by its literature and clinical experience, into two main bodies; the one believing, with Thompson, Magitot, and others, that "all formed teeth are unaltered after formation, either in follicle or after eruption" (Thompson, "American System of Dentistry," vol. iii); Magitot says also, "If the alteration were chemical in its nature there would be no alteration in the center of the organ, which is always present."

We find the theory of the other faction, which is ably represented by Bödecker and Heitzmann, best stated by Brubaker, who says, "Let it be borne in mind that calcification once established is not forever permanent, but that living dentin, like living matter in all other portions of the body, in the performance of its functions is continually undergoing disintegrative changes, giving rise to waste products . . . and at the same time undergoing integrative changes by assimilation of nutritive material" (Brubaker, "Observations on the Nutrition of the Teeth," DENTAL COSMOS, 1895).

We have only to take up any dental journal and, following the discussion, note the tacit understanding apparent of some force acting to weaken the dentin from within, as shown in syphilis, tuberculosis, anemia, wasting fevers, pregnancy, and even neurasthenia, to reach the conclusion that this force is no small factor in the experience of every practitioner of dentistry and an important item in the daily record of success and failure.

The statement of the fact of dentinal change is much easier than its verification on pathological grounds, and we are confronted by the query: By what processes do these changes occur in the solidly formed dentinal structures?

We learn that dentin is a deposition of mineral salts in the meshes of a specialized connective tissue which forms the organic matrix, "a delicate reticulum pervading the entire structure." We wish here to emphasize the fact of not only a deposition, but, in normal dentin, a chemical union between the cells in this reticulum and the mineral salts. The entire dentinal substance is freely perforated by tubuli, which are tenanted by fibrils; and these fibrils have frequent communication through "transverse connection fibers," which pass from tube to tube. Of these Bödecker says ("Anatomy and Pathology of the Teeth"), "The rectangular offshoots of one dental fiber inosculate directly with neighboring fibers, thus furnishing a pretty figure of a ladder with minute rungs."

These fibrils do not occupy the entire dentinal tubule, but are beaded in appearance, thus presenting spaces between the fiber sheath and the tubuli walls, and in many instances the fibrils are distinctly tubular. The spaces so left, apparently vacant, are occupied by a specialized fluid, which flows not only through and around the fibrils, but through the delicate transverse connective fibrils, joining tube to tube and forming a complete circulation. To quote again, "If, besides these points, we observe that the dentinal fibrillæ are of a vacuolated structure and that the ultimate fibrillæ have a rosary or beaded appearance, we are prepared to acknowledge the possibility that in living dentin the living matter proper is at no time perfectly at rest; that, on the contrary, it is contracting slowly (like all protoplasmic fibers) but continuously, and that through these contractions it not only stirs the surrounding column of liquid, but pumps nourishing material to the minutest fields of dentin or away from them. The chemical character of this fluid may explain the dissolution of a certain amount of lime-salts deposited in the 'blocklets' of the basis-substance, which salts, thus being rendered effete, may be carried into the lymphatics of the pulp and thence into the lymph system of the body for further elimination." (Bödecker, *Ibid.*)

The delicate reticulum forming the organic basis of the dentin and the fluids circulating therein are thus considered prime factors in dental health, not only by the microscopist, but by the physicist as well. Dr. Black's conclusions, after exhaustive tests of dentinal structures, are as follows: "That difference in density or percentage of lime-salts in the teeth is not the controlling factor in the strength of the teeth, nor in their hardness, this seeming to depend upon the condition of the organic matrix.

"Teeth that have become badly worn from mastication, and in which the pulps become so much calcified as to cut off nutrition of the crown portion of the dentin, lose strength apparently from the deterioration of the organic matrix.

"Teeth that have lost their pulps and have become discolored lose strength in a marked degree apparently from the destruction of the organic matrix."

Last and most important of all,—

"Differences in the strength of teeth have no influence as to their liability to caries. Differences in the density or percentage of lime-salts in the teeth have no influence as to liability to caries."

It is thus established that in the organic portion of the dentin, and *not* the hard tissues, lies the power to resist stress of all kinds and, by a correct chemical union of the fluid it carries to the "blocklets" of dentin, so revivify them as to delay at least the ravages of caries.

Of this very important chemical union Brubaker says ("Observations on the Nutrition of the Teeth," DENTAL COSMOS, 1895), "By the term calcification let it be understood also a chemical union, not a deposition merely, between the lime-salts and the organic dentin brought about by living protoplasm."

Now, if the necessary lime-salts in solution in the fluid plasma circulating in the anastomosing tubuli reach the dentinal tissues requiring their aid, and if there exists some abnormal condition of these tissues through which, even if the lime-salts are taken up, they are held in deposition mechanically, rather than in a true chemical union, we have as marked a state of malnutrition as if the necessary inorganic elements had not been supplied in the food, or, if supplied, were not assimilated in the alimentary tract. An excessive example of such a state of affairs acting on body tissues exists in the syphilitic, tubercular, scrofulous, and gouty diatheses. Syphilis is a disturbance in the character of the protoplasm affecting the cell assimilative power of the entire body, due to a specific poison.

While this example is in its constitutional effects much in excess of the condition we wish to make plain, it serves to show how a specific poison will produce malnutrition, and the malnutrition in turn will produce lesions of hard tissues. Potassium iodid corrects this malnutrition by its specific action on the poison.

It would appear that there exists a true "*carious diathesis,*" if you will allow the term, which, while not necessarily dependent on specific poison, is undoubtedly due to one or all of the three following conditions:

The first is local, and is the result of a failure on the part of the protoplasmic organic matrix of the dentin to take up the nutritive lime-salts furnished by the circulating fluid plasma to form the new chemical combinations so necessary in renewing the waste produced by the loss of effete material.

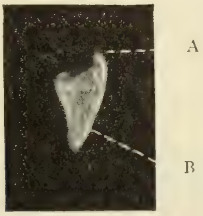
Second, a diminution in supply or total absence of lime-salts from the fluid plasma, due to a failure on the part of the fluid to form a solution of these salts.

Third, a defective digestive procedure and assimilation whereby these salts, though amply provided in the food, are not taken into the system.

Any of these conditions may produce in a healthy denture tooth-structure lacking in tone from malnutrition, non-resistant to the onset of caries; in fact, what Dr. Black terms a "carious dyscrasia." As the cause of these conditions we would note the artificial, neurotic life of to-day, a neurasthenic condition prevailing largely.

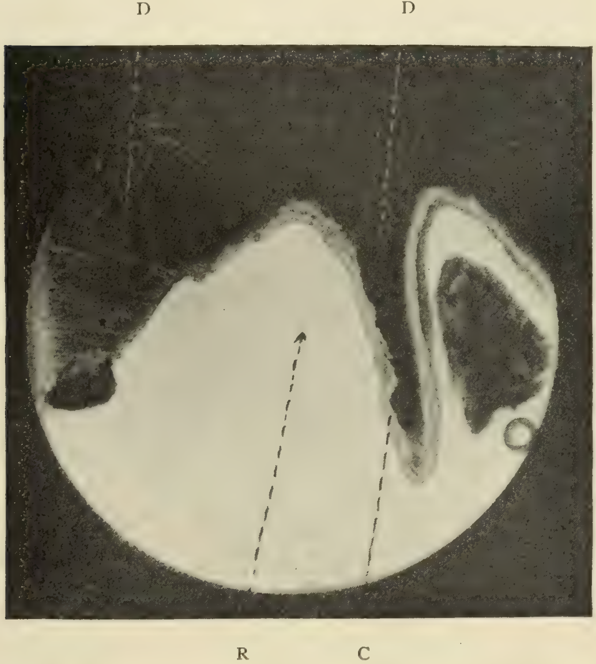
It is to these causes and conditions, aggravated by disease, that we would lay the effects on apparently good dentures noticed in the wasting fevers, anemia, neurasthenia, etc.

FIG. 2.



Vertical section of crown showing where fields A and B were taken.

FIG. 3.

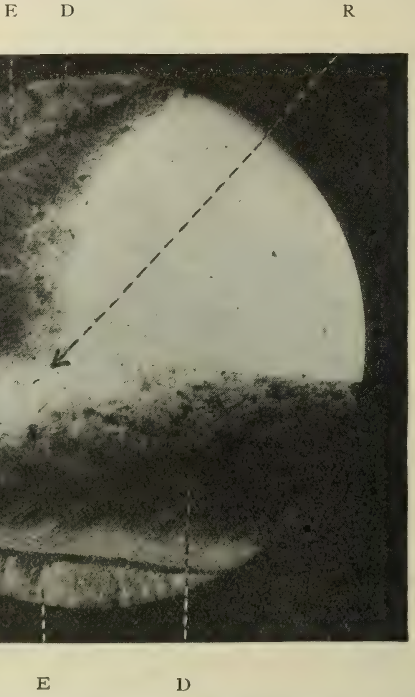


Slide from temporary molar crown. D, Dentin. R, Resorption area. C, "Bays" cut in dentin.

That the case presented differs in its pathology from the conditions described is no doubt true, but this denture was evidently suffering (just as the writer believes nine-tenths of the teeth presented to-day suffer) from some one or all of these states described as of carious tendency.

The already softened dentin falls an easy prey to the resorptive processes now to be described, and may in itself have acted as a local irritant to produce resorption. You will note the striking similarity in the appearance of the "bays" cut in the healthy dentin in this case (Fig. 4) as compared with the micro-photograph of the resorption in temporary teeth (Fig. 3), the difference being one of rapidity only; the process occupying only a few days in the case presented, while in the temporary root it lasted as many months,—resorption in the case under discussion, just as in the roots of temporary and implanted teeth, following the principles of resorption of hard tissues generally, whether foreign or native, throughout the body.

FIG. 4.

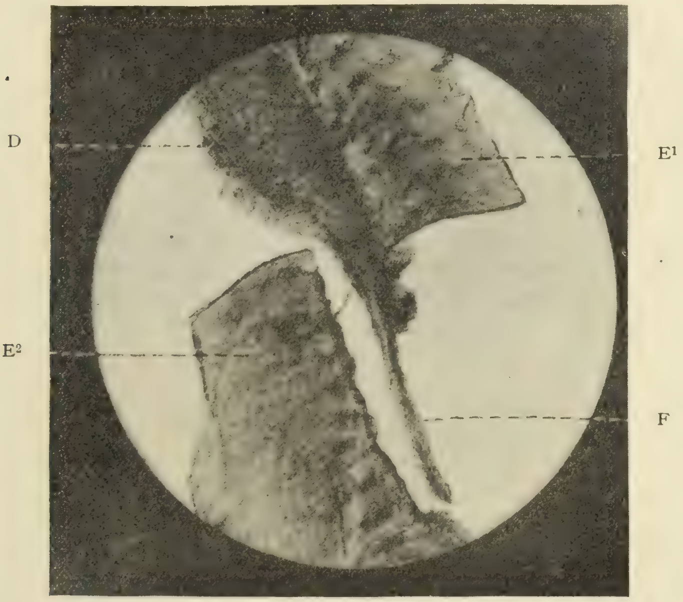


Field B. E, Enamel. D, Dentin. R, Resorption area, showing "bays" cut in dentin.

The only other condition approaching in its pathology the case presented with a distinctive dentinal resorption is described by Heitzmann and Bödecker as "eburnitis, or inflammation of dentin." They say, "Aside from the secondary forms of inflammation (produced by caries, etc.), there occurs a primary inflammation in the dentin, independent of pulpitis or pericementitis, running its course in the middle of the dentinal tissues and leading, as do all inflammatory processes, either to a new formation or to destruction by suppuration." Dentin subject to eburnitis is always incomplete in calcification, showing a number of interglobular spaces, thus increasing the tendency to irritative processes; the enamel is also abnormal and insufficient in lime-salts. The causes assigned in normal dentin are local; traumatism, as burring, excavating, etc.; action of caustics, and irritation from oxyphosphate and other filling-materials, but no constitutional cause is assigned.

The case presented does not share in the symptoms of eburnitis, —the resorptive process was from the pulpal portion equally in all directions, not locating in areas. It was "*a progressive resorption,*" in that it attacked the superior central incisor group simultaneously. The action was alike, though with less violence in enamel and dentin (see Figs. 4 and 5); enamel is never resorbed in eburnitis.

FIG. 5.



Field A. E1, Enamel wall. D, Dentin. F, Fibrous layer remaining after resorption of dentin. E2, Enamel rotated on slide to show F.

Lastly, it was followed neither by suppuration—the pulp-tissue being healthy when uncovered—nor effort at repair, but ran its course until stopped by surgical interference.

So we find this to be a *true decalcification and destruction of dentinal tissues,* due, like other resorptive processes of hard tissues in the body, to the action of giant cells.

These cells are variously termed embryonal tissue cells, resorptive cells, osteoclasts, and, with regard to resorption of roots of teeth, odontoclasts. (Black.)

Ziegler says these cells are the product of the multiplication of the white blood-corpuscles; they secrete a specialized fluid which is acid in reaction, and has the power of disintegrating tissues.

whether dead or alive, foreign or native to the body. (Sudduth.) Amoëdo (on "Implantation," DENTAL COSMOS, 1895) claims that the solvent action of these cells is due to lactic acid, which he affirms they secrete.

In rickets, that disease having for its cause perverted nutrition, we find a resorption of the bony tissues by these cells which is characteristic. Speaking of the primary lesions existing in rickets in the osseous system, Kussowitz, the highest authority, says, "Increased vascularity of formative tissue disturbs normal nutritive processes in bone formation." He has demonstrated that defective deposition and even an assimilation of lime-salts follows a hyperemic condition. So there occurs not only interference with the repair of the bone deposited, but, from an increased vascularity flooding the tissues and interfering with nutrition, an actual resorption of that deposited.

Sections of long bone show hypertrophy; the zone of proliferation is very vascular; the shafts of the bones are covered by spongy material representing decalcified bone. (Brubaker.)

If perverted nutrition will produce these large vascular areas in the formative bony tissues of a child, why not a similar effect on the dental pulp—which we must look upon as always in a truly formative condition—in the man? The resemblance of dentin to bone in manner of assimilation of nutritive supply would lead us to believe that increased vascularity in the dental pulp may produce in the dentinal tissues under similar conditions just what Kussowitz has proven it produces in bony tissues,—*i.e.,* a resorption.

We find many local causes for bone and dentin resorption: pressure on the parts by certain organs, as by the growth of an aneurism; the movement of the teeth, whether by appliance or unusual stress due to malocclusion, and the operation of implantation, which produces a temporary ostitis, and hence an absorption of not only cementum, but of dentin. While not advanced as a fact, it seems plausible that the absorption of temporary roots may in a large degree be due not to the pressure produced by the actual contact of permanent crown and root, for the root frequently absorbs on the opposite side, but to an increased vascularity produced by the advancing tooth in the surrounding tissues and a consequent odontoclastic action. Even in lasting purulent conditions, as pyorrhea and chronic alveolar abscess, while many writers draw the line between physiological and pathological absorption, Black and others have shown that there is little difference, and that only in intensity, in the inroads of giant cells upon root tissues.

In the resorption cases under consideration we assume that the causes were not local, but general. Given a perfectly healthy patient, good family history, no syphilis or tuberculosis, inherited or acquired, a fine dental outfit, with no lesions save caries, and that in the minimum, we have for a predisposing cause any aggravation of the prevalent condition previously described as a "carious diathesis." As an actual cause any of the many states named as producing rickets in childhood (as bad hygiene, excessive use of farinaceous foods, overeating, lack of out-door life, etc.) might readily in the adult affect the dental pulp, and lasting for a short time, as in this case, produce vascularity and consequent resorption.

Following this line of thought, other teeth in the same mouth should have presented, had opportunity offered for investigation, the same phenomena as these centrals, only in less degree, showing an enlargement of pulp-cavity and generally weakened dentin. No doubt such was the case, improved general conditions and corrected nervous reflexes and assimilation in this instance quickly averting what might have proved a serious state.

The facts in the case bear out this idea, my diagrams showing more caries and of deeper action in the past five years than occurred in the entire life of the patient prior to the resorptive action.

It would seem poor therapeutics to dose the case presented with any of the various forms of soluble prosphates of lime, to the entire exclusion of other remedies, when the patient had sufficient for his needs in the good plain food consumed. The cause being not in the quality or quantity of the food, but in a disturbance of cell assimilative action, it would seem that alteratives and nerve tonics are the remedies which should be exhibited, such as phosphorus, syrup of the iodid of iron and arsenic, cod-liver oil, etc. This is much the same treatment as adopted in rickets, the lime-bearing tonics and foods taking an important but secondary place. Brubaker says this treatment is borne out by the excess of phosphates of lime in the urine of rickety children.

Much the same reasoning is to be followed in selecting a diet; good plain food, with improved hygienic conditions, should assist in restoring the tissues to a normal condition.

In closing, if you will permit a moment's digression, there seems to be little indeed in the theory that foods with a low percentage of phosphates of lime are responsible for a weak and non-resisting tooth-structure.

Thompson ("American System of Dentistry," vol. iii) says, "A vigorous African will have a good denture, though he eats only fruits and nuts; a vigorous Esquimaux will have equally good teeth on fat and raw hide." Numerous specimens in our museums prove the dentures of the aboriginal races were exceptionally correct. These races were dependent for their food supply on the natural products to be had from the environment, which was frequently faulty in quantity and quality. Different latitudes required and furnished different foods, but all produced equally good dentures. Our population, with the finest food the world affords, and in greater variety, produces a denture notably defective. It would thus appear that even the poorest fare contains sufficient lime for a good osseous and dental system, provided the digestion and, more important still, the assimilation be normal.

But the best of foods under our present artificial and neurotic method of living will produce teeth apparently non-resistant to carious action. We can find no better advice both for our patients and ourselves than that of Shakespeare, who says, "Let good digestion wait on appetite, and health on both."

(To be continued.)

NATIONAL DENTAL ASSOCIATION.

(Continued from page 919.)

FIRST DAY—*Evening Session.*

THE association was called to order at 8.10 P.M.; President Burkhart in the chair.

The privileges of the floor were granted to Dr. John E. Grevers, of Amsterdam, and Dr. Wm. Mitchell, of London, as delegates from the American Dental Society of Europe.

A communication from the Virginia State Dental Association, inviting the National Dental Association to hold its next session in Virginia, was read and laid over to the time for the selection of the next place of meeting.

Section II, Dental Education, Literature, and Nomenclature, was called, and the following report was read by the chairman, Dr. S. H. GUILFORD, of Philadelphia:

Your committee, in offering its annual report, begs leave to call attention to the number of valuable works relating to dental science which have been published in America during the past year, as shown in the following list: "Anatomy and Histology of the Mouth and Teeth," by I. N. Broomell, D.D.S.; "Comparative Dental Anatomy," by A. H. Thompson, D.D.S.; "Chemistry and Metallurgy as Applied to Dentistry," by Vernon J. Hall, Ph.D.; "The Practice of Dental Medicine," by Geo. F. Eames, M.D., D.D.S.; "Interstitial Gingivitis or so-called Pyorrhea Alveolaris," by E. S. Talbot, M.D., D.D.S.; "Cataphoresis, or Electric Medicamental Diffusion," by W. J. Morton, M.D.; "Methods of Filling Teeth," by R. Ottolengui, M.D.S. (second edition); "Dictionary of Dental Science," by F. J. S. Gorgas, M.D., D.D.S. (sixth edition); "Dental Medicine, or a Manual of Dental Materia Medica and Therapeutics," by the same author (sixth edition).

Dental periodical literature has neither advanced nor declined during the past year, if measured by the number of publications issued. *The Dental Practitioner and Advertiser* has been discontinued after a useful existence of twenty-nine years, while the *American Dental Weekly* closed its career at the end of the first year.

The new periodicals of the year are *The American Dentist at Home and Abroad* (monthly), edited by Chas. R. Hambly, D.D.S., and *Information* (monthly), edited by L. P. Bethel, D.D.S.

Dental journalism has been enriched during the past year, probably more liberally than in any preceding year, by the contributions of our best writers, thinkers, and workers. In the line of histological research it may not be amiss to mention the labors of Dr. J. Leon Williams and Professors Broomell and Cryer; in artistic development in the practical line the work of Dr. N. S. Jenkins is to be commended, while in the clear presentation of methods in operative procedure the articles of Professor C. N. Johnson are worthy of all praise.

Dental education has shown its usual advancement. In accordance with the rule of the National Association of Dental Faculties, the requirements for college entrance during the year just passed have equaled the completion of a grammar school course, while those for the coming year will be the equivalent of one year's high school study. The entrance requirements, as well as those for graduation, will steadily increase as rapidly and to the extent of the best wisdom of those having our educational interests in charge.

For several years a degree of tension has existed between the National Association of Dental Examiners and the National Association of Dental Faculties, but it is our pleasure to report that within the past twenty-four hours all differences have been adjusted and perfect harmony between the two bodies restored. It is hoped and confidently believed that as a result of this agreement the interests of dental education will be materially and permanently advanced.

The number of schools which are at present members of the National Association of Dental Faculties is forty-six, while the number outside of its jurisdiction is probably less than a half-dozen.

Section II has carefully examined the papers presented for approval under its general head of Dental Education, Literature, and Nomenclature, and begs leave to offer the following: "The Specialization of Our Preliminary Education," by R. H. Hofheinz, D.D.S.; "Dental History, a part of the College Curriculum," by B. J. Cigrand, M.D., D.D.S., and "Roentgen Rays," by C. Edmund Kells, D.D.S.; also a historical paper by J. A. Chapple, D.D.S., entitled "The Legal Status of the Graduate Dentist."

Under the head of nomenclature only one paper has been presented,—namely, "Dental Articulation and Occlusion," by Wm. Ernest Walker, D.D.S.

All of these papers will be read by their authors.

S. H. GUILFORD, *Chairman,*
M. F. FINLEY, *Sec'y.*

Dr. R. H. HOFHEINZ, Rochester, N. Y., read a paper entitled "The Specialization of Our Preliminary Education."*

Dr. B. J. CIGRAND, Chicago, read a paper entitled "Dental History, a Part of the Dental Curriculum." A synopsis of this paper follows:

Dr. Cigrand said that one of the most gratifying evidences of the progress of modern dental science is the ever-increasing interest manifested in historical research, and the study of the development of the various branches of dentistry. This is particularly evident in the dental colleges. It is only in comparatively late years that dentistry has occupied a recognized position among the different departments of medicine, for in early days it was practiced, to a large extent, as a superadded means of livelihood by persons engaged in other pursuits, and without professional education or discipline. Dentistry in its crude state was introduced into America something over one hundred years ago, and the public becoming aware, by benefits received, of its indispensability, the dental college and dental societies followed as natural sequences.

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*This paper, with the discussion which followed, will appear in a later issue of the DENTAL COSMOS.

Within the brief period of fifty years its advancement has been so pronounced that to understand and to expound the whole extent of the subject is already impossible.

To the dental student every subject that pertains to the history and progress of his art is fraught with interest. The dentist who is ignorant of the trials and tribulations of the early surgeon-dentists is not unlike the patriot who glories in the triumphs and achievements of his native land, but knows not of the making of the established institutions he so fervently loves. Such patriotism is but superficial.

Dr. Cigrand made an earnest appeal in behalf of the recognition of the labors of those who have sought to gather the fragmentary knowledge of dentistry and weave it into a true history. After referring to his own work in this line, both in publications and lectures, he stated that there were at present six medical colleges which included in their curriculum the subject of medical history, and that a text-book on this branch, including also dental history, had recently been published by Dr. Roswell Park, of Buffalo. That the profession is awakening to the importance of the matter is evidenced by the fact that within the past two years more than seventy-five papers treating of dental history were read or published.

Now is an opportune time for the preparation of a compendious history of dentistry. If the association feels that this is too large an undertaking, let the work be confined to preparing a history of the profession in America. Further, it will be of greater interest and be of more universal service if the history be written in a thoroughly national spirit, leaving the profession in the various states to be written up by the several state dental societies.

With the great majority of the ethical practitioners and the large student-body anxiously awaiting the dawn of further light on this theme, why need we still hesitate to go on with the work? The time has fully arrived, and the opportunity is afforded of going before the great congress of dentists at Paris with the unparalleled history of the youngest sister of medicine as a portion of our contribution to its proceedings.

Dr. Chas. McManus, Hartford, Conn., was pleased with the paper, and grateful for the interest which Dr. Cigrand had shown in the subject of the work of the Committee on History. He thought that the work would have to be taken up more slowly than Dr. Cigrand says. It is a dry subject, but some are interested in it, and the committee hoped to have a reliable result.

Dr. H. L. Ambler, Cleveland, O. We as a profession are clamoring for a higher standard; we want to be recognized as on an equal footing with the medical profession. One essential to this result is to have a good history; the medical man is proud of the past of his profession, and justly so. If we want to get onto the same level, let us do all we can in state and local societies to have prepared a proper dental history. The writing of dental history involves a great deal of work. One way has been suggested by which it shall be compiled through the state and local societies, and then brought together and published. If done as a private enterprise it would be an almost endless task. Dental history is older than the United States, older than one hundred years, and we need not be ashamed to tell where it originated. He was glad to know that the colleges were teaching dental history, and he was sure that they could do nothing else which would better help to place the profession on a high plane among those outside of it. There was no question that the people were interested in history. One method of teaching this subject in the colleges suggested that it be made a part of the freshman year studies. The idea among several who have considered the matter carefully is that the teaching should be given in the third year, so as to be fresh in the mind of the graduate.

Dr. W. C. BARRETT, Buffalo, N. Y., was more anxious to see proper history made than to record it. As long as such foolish traditions are told to students as dental history that there was such a thing as crown- and bridge-work at the time the Christian era began, our teaching of dental history will not have much value. That dental caries is a disease of modern origin is another fable which we are having exploded. What we want and must have in history is truth; and that we shall not have as long as men receive traditions as verified facts, teach them to others, and so pass them on. We need instead to search out the truth regarding each one of them before we accept or pass it on.

Dr. G. V. BLACK, Chicago, wished we might have a fourth year in the colleges in order that we might teach dental history to the students at a time when they were prepared to receive it. He would teach the history of dentistry by going before the class and, pointing out the old books, let the students read the sketches of various operations in these old books, of the methods of performing operations, following each method out in every item down to the way of accomplishing the same result we teach now.

Dr. CIGRAND said that his paper was intended simply as an appeal to the members to help the committee which has been appointed to work on this subject. Dr. Barrett has voiced the proper sentiment; we want truthful history. If the work to be done has the seal of approval of this body, we shall have a real history. Much that has been received as history on investigation is found to belong to mythology. History cannot be written; it is discovered.

Dr. W. E. WALKER, Pass Christian, Miss., read a paper entitled "Dental Articulation and Occlusion."*

Dr. BARRETT, chairman of Section VII, Anatomy, Pathology, and Surgery, asked that Dr. Brophy's paper on cleft palate be made the special order for to-morrow at 11 o'clock, as the patients brought on from Chicago to illustrate the results of Dr. Brophy's operation would be here at that time. So ordered.

Dr. J. A. CHAPPLE, Atlanta, Ga., read a paper entitled "The Legal Status of the Graduate Dentist."†

Adjourned to 9 o'clock Wednesday morning.

(To be continued.)

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*This paper was printed in the DENTAL COSMOS for September, page 892.
†This paper was printed in the DENTAL COSMOS for September, page 886.

NEW YORK ODONTOLOGICAL SOCIETY.

A REGULAR meeting of the New York Odontological Society was held on Tuesday evening, May 16, 1899, at the New York Academy of Medicine, No. 17 West Forty-third street, New York city. The president, Dr. S. G. Perry, occupied the chair.

INCIDENTS OF OFFICE PRACTICE.

The PRESIDENT. It is sometimes our habit to forecast the future, but I think it is often as well to review the past. In looking over the work of this society for the past winter, we may well say it has been an eventful season. In the first place, Dr. Jarvie early in the season led in the discussion of the subject of the thoughtless and careless display of gold in the mouths of our patients, and fittingly, at a later meeting, Dr. Head, of Philadelphia, read a paper before us on the subject of porcelain inlays. Dr. Jarvie made some very strong statements, indeed, in his remarks on the display of gold. It seems as if all that Dr. Jarvie said were true, in every sense of the word, and from my standpoint of observation it seems to me that the profession, in this community at least, has made singularly rapid progress in the last few months in the matter of making the teeth of patients more presentable. I do not know whether I speak more from the bias of my own feelings or whether I express what is in the public mind, but it seems to me there has been great progress made very recently toward a higher standard. The time has gone by when the display of gold in the front of the mouth will be permitted. For over a quarter of a century we have been searching for means to save teeth from decay, with little thought of their appearance. With the use of the electric furnace and the substitution of porcelain fillings for gold we have made an immense stride in preserving their appearance. I take great pleasure in calling attention to this from this place at this time. I want to see it emphasized, and I want to have the profession awaken to the fact that we have been going through a long period of barbarism, during which we have been thoughtless and reckless in displaying gold in the front of the mouth.

I feel it has been for us a fruitful year. The reading of Dr. Williams's paper was the remarkable beginning of a new era. Then, also, vapocain has been introduced to us, by which we can make our operations more comfortable than before, even though it may not render them absolutely painless, as we had hoped in the beginning.

Dr. WILLIAM JARVIE. I was impelled early in the season to give expression to my strong dissent from the unnecessary exposure of gold in the front of the mouth. It seemed to me it was an exhibition of barbarism, and that we ought to be able to restore broken-down teeth in some other way than by the use of gold. The subject of porcelain inlays was made prominent about that time, and I think the presentation of those two subjects has done much to bring about not only a change of sentiment, but a change of practice at the hands of many of our best dentists. The evolution in the process of making porcelain inlays has been so rapid that there are several gentlemen in this room who have given up almost entirely the use of gold where it would be exposed to view, and use porcelain instead. The perfection which has been attained by this means is marvelous. You might look at a tooth quite closely now, and, unless your attention had been specially called to it, you would not suspect that it had been repaired at all. I think we have been enabled to do this largely by the application of electricity in our offices. The furnaces we have to-day are so easily and quickly worked, and with so little heat distributed about the office, that it is really a pleasure to use them. The application of electricity in our offices, in the way of engine, mallet, cautery, illumination of the mouth, etc., has so facilitated our operations that I have taken a greater pleasure in the practice of my profession this winter than ever before.

The gradual evolution of this whole subject of the esthetic in dentistry, from the beginning of the season until the present time, is really a wonderful advance.

Dr. J. BOND LITTIG. The habit of dentists in the present day of opening the front teeth from the labial surface, instead of the lingual or palatal, and putting in gold fillings that show a large surface in front, certainly is not any better than putting pieces of gold on the ends of teeth, or filling labial surfaces with gold, when they could do it with porcelain. It has been my custom always, and I think it is that of most of the older dentists, to open the cavities from underneath, and if I cannot see quite so well I use a mirror, and do not expose the gold surface to view. I think the practice of filling teeth from the labial surface rather than the posterior or the palatal surface is growing largely. For that reason I wish to enter my protest against marring the mouth with work of this kind when it can be avoided.

Dr. J. H. HANNING. There is another side to the question of porcelain inlays: you save your patient a great deal of pain. Many patients complain bitterly of large contour fillings,—complain of the heat and cold; but with porcelain you have practically a non-conductor which avoids all that.

Dr. M. L. RHEIN. Porcelain inlays is a subject that I took up about twelve years ago, and, after putting in a great many at that time made with the aid of gas furnaces under pressure, the difficulties that continually beset the work in gassing the porcelain were so great that it came into considerable disfavor with me. The electric furnace has overcome that difficulty so absolutely that there is left no excuse at the present time for the eyesores that all of us have seen.

I also want to add a word of approval to the remarks made in regard to opening up approximal anterior cavities from the labial surfaces. I trust the practice will grow into disuse. That is one of the surfaces where porcelain fillings are not permissible, except in a limited number of cases, unless we remove an unnecessary amount of tooth-substance, or unless we separate to an uncalled-for extent, and it will unquestionably be necessary to fill the major part of approximal anterior surfaces with gold. There seems to have been a lack of good teaching in regard to the mouth-mirror with a large number of dentists. Last week, at the meeting of the New York State Dental Society, the most interesting paper of the meeting was by Dr. Shepard, of Boston, on this subject. As he reported it to us, it was really the re-reading of a paper of his of twenty-seven years ago,—the advocacy of the use of the mouth-mirror for just such places as was mentioned this evening. It always seemed strange to me how a man could work in the mouth without the use of the mouth-mirror from the beginning to the end of the operation. I think as much can be done to favor the appearance of the esthetic condition of the mouth by this subject as any other.

The PRESIDENT. I must beg to differ a little with Dr. Rhein in this. I do believe that the filling of approximal surfaces in front teeth will before long be done more with porcelain than with gold, although it may necessitate wedging the teeth apart more freely than for gold. It is an easy matter after the cavity is prepared to fill with the oxyphosphate in the usual way, and arrange for the porcelain to be put in only as a thin veneer. If that is made thin, then the teeth need not be wedged so far apart. In a sheltered place on an approximal surface scarcely any undercut is required, and the veneering of porcelain can be very thin; so perhaps the wedging question will not be so serious after all. I grant all you may say of the accuracy and durability, etc., of gold; but the teeth are translucent, and the gold, no matter how carefully packed, will always cast a little shadow, which the porcelain will not do.

A patient once having a porcelain filling with a nice joint will not be content until all the other fillings are taken out.

A method I have sometimes followed of obtaining a model of the tooth and cavity from which to make the matrix is as follows: Either wet the cavity or oil it, and then take an impression with red impression-material. Take that out and oil it thoroughly, and then work around the little protuberance the oxyphosphate of zinc in proper consistence, letting it harden, and you have an exact duplicate of the natural tooth in oxyphosphate. Into that little cavity, which is quite clearly defined, you can burnish your matrix of platinum, and do your baking without trying it in the mouth at all. You will not get so close a fit, however, as by actually burnishing in the tooth.

The paper of the evening was then read by Dr. HENRY S. NASH, entitled, "Some of Our Mistakes about Periodontal Diseases." It is printed in full at page 981 of the current number.

Discussion.

Dr. JARVIE. We have all listened very attentively and with a great deal of interest to this paper. It is the result of much study and research. The disease itself probably interests dentists as much as anything with which we come in contact. I followed the paper as well as I could, but it is one which I would not attempt to discuss offhand, though I shall read and study it with a great deal of attention. It is a contribution of great value to the literature upon this subject.

Dr. Rhein. I have been very much interested in the work that has been done by Dr. Nash on this subject. The most potent form of objection that I personally raise is that in his individual views, as presented to us, he assumes altogether too dogmatic a tone for a subject that is in the condition that this is at the present time. Personally I have felt, after reading his work and after listening to him this evening, that in regard to a great many of the pathological conditions I am very much in accord with his views, but as to the nomenclature of the subject, while the term "pyorrhea alveolaris" is a very unsatisfactory one, I cannot find any more satisfaction in the word "alveolitis." There is a form of this trouble that is a local manifestation of a local irritant, and for that form of the disease a name which would define the disease *per se* would be properly in order; but we rarely consider that form of the trouble (pyorrhea simplex) when discussing the subject. The forms of the disease we refer to generally are those where the pathological conditions are the results of malnutrition. They are symptoms, and nothing else; and therefore I have felt that we have no legitimate right to give a distinctive title to that manifestation, as a disease itself, without adding to it something which will be indicative of the real etiology of the trouble.

To-night I would gladly accept the term that he proposes, if he could give a rational explanation of how it will cover every form of degenerative condition of the region we are discussing, including the absorption of the sockets of the teeth and the pericementum itself; but he has left out a very large number of types of malnutrition which will produce these conditions just as perfectly as those he has mentioned, although with different clinical symptoms. Yet it is in this respect that I am very much in accord with him when he speaks so distinctly and clearly in regard to the differentiation of the clinical appearance of the different forms of the disease. I have endeavored for some years to illustrate the point that the different forms of pyorrhea alveolaris present themselves to us as different types and with different conditions, according to the etiological condition, and consequently I have advocated the plan of adding to the nomenclature the type which is the direct cause; as in his case of bismuth alveolitis, I would call it bismuth pyorrhea alveolaris, or mercurial pyorrhea alveolaris. We have there simply an expression of the symptoms we meet with in the mouth, due to a certain general derangement of some part of the system that has been localized.

Dr. O. E. Hill. Pyorrhea alveolaris, as you are speaking now, means simply a symptom?

Dr. Rhein. Yes, that was one of the objections Dr. Nash made, and it is a powerful objection to the manner in which the term has been generally accepted. We must not look upon it as a distinctive disease. It is a symptom of malnutrition, and which leaves sequelæ which we try to correct if the general condition has been improved. If a better term than this could be brought forth I would be only too happy myself to adopt it, but none of the arguments of the essayist have convinced me that the words, as we have been using them, can be better discarded for this term. It has this thing in its favor: it is more universally used than any term that is known among us, and the fact that the medical profession know nothing of this term, and are not acquainted with the importance that malnutrition plays around the necks of teeth, does not prevent our coming to a scientific conclusion as to what the real pathology of this subject means.

In regard to the essayist's discussion on tophi, I both agree and disagree with him. I agree heartily in one fact,—that the presence of tophi on the roots of teeth is very uncommon, but I am positive that they occur, although but rarely. The clinical condition he mentioned, that sometimes it would burst and he would get evidence of uric acid in this way, shows that this may occur from his own point of view. I have specimens of teeth that I have extracted, and one that I only gave for publication yesterday, showing the most beautiful nodular deposit on the end of a root,—as perfect a tophus as I have ever seen in a miniature form; and we would expect a miniature form on the end of a root, because the articulation is so much smaller there than at the knee-joint or any other joint in comparison. This specimen that I looked at yesterday has the pericementum around the gingival border, and the lower three-quarters of the tooth in perfect condition. The tooth has been preserved by me in the most careful manner, and the clinical history of cases that have been given before this society of people suffering with the most frightful neuralgic pains, showing the sudden onslaught of a uric acid deposit, has been observed by such men as Professor Darby, of Philadelphia. The fact that such things do occur has been as well proven as any clinical fact can be. I agree with the doctor that there are some cases where we get at the end of the root a clear, well-defined smooth deposit, so hard and flinty that it is impossible to remove it with instruments. I have seen some like that, and have some in my possession. I also agree with him that the attachment of the root in the socket is a distinct articulation. We have the ball and socket articulation and other forms that come under the term diarthrosis, and from that point to synarthrodia there are various types bordering more or less on either type, and it is in this class that I would place the tooth articulation. The old term of gomphosis, representing something immovable, that is positively chained and buckled down, is a most ill-fitting term for a root in the socket. It would be impossible for us, if this were true, to move teeth about and wedge them, as we do for filling purposes. That it is limited in the amount of motion there is no doubt. There are none of the lubricating fluids present that we get in the knee-joint or other joints. One of the most important points we have to clear up is whether the lining membrane of the socket is the same membrane that covers the root of the tooth, or whether there are two membranes.

While I do not care to give a definition of the term "phagedenic pericementitis" as introduced by Professor Black, yet if the clinical symptoms are to be used as a point of nomenclature there is much in Professor Black's designation of this term in which I do not agree with the deductions made by Dr. Nash. The phagedenic conditions of which he speaks I am well aware of. I know they are almost entirely relegated to conditions of the chancre variety relating to venereal types; but the condition he cites here is a marked clinical symptom in certain forms of pyorrhea alveolaris, which Professor Black has termed phagedenic pericementitis, from the very fact that the sharp and rapid ulceration of the tissues so closely resembles this type. If we are to adopt a term that will embrace the clinical symptoms, this would be a good one.

The essayist stated that his great objection to the term "pyorrhea alveolaris" was that there was a type of the trouble where no pus was ever manifested, and where the descriptions speak of it in this form. With our present knowledge of the subject, that is a very rash statement to make. The point is, we have a retrograde metamorphosis surrounding the root of the tooth which is going on according to the etiological factor. The presence of pus there is due entirely to the extent of infection. The mouth is filled at all times with bacteria. The amount of vitality present to resist these bacteria at different times determines whether there shall be a pus-generating element entering into it or not; whether the vitality of the person is insufficient or otherwise to prevent the micro-organisms from infecting this tissue which is undergoing a retrograde action.

Dr. HENRY S. NASH. I would like to mention a little incident that occurred in my practice a few years ago. A French lady was sent to me by Dr. Evans, of Paris. One of her lower teeth was loosening very rapidly. She came to the office one day without previous announcement, and I examined her tooth at her request and found it a case of idiopathic alveolitis. There was no tartar there. I said, "You have idiopathic alveolitis." She asked me to repeat it, and then said, "Oh, my God, what have I not got!" It transpired that on her trip to New York she had visited dentists in Paris, London, Boston, and Hartford, and each one gave the trouble a different name. Dr. Evans said she had pyorrhea alveolaris. In London she was told it was gangrene of the gums. On shipboard she asked the surgeon of the vessel what was the name of her disease, and he said he did not know. At her request he wrote the names she had already heard on a card for her,—pyorrhea alveolaris and gangrene of the gums. When she arrived in Boston she was told she had calcic pericementitis. This she wrote on the card. In New Haven she was told she had Riggs's disease, this name also being recorded. She was not to be consoled any more, thinking, and with ample reason, that none of us knew anything about her trouble. I treated it for her, however, and it soon yielded, to her great delight.

One thing more I would like to mention, and that is that the growths on the ends of the roots which were alluded to by one of the speakers as being tophi were simply hypertrophies of the cementum,—acronic hypercementoses. There is another form which is found on the necks of the roots, which grows clear around them. This is termed general, or marginal, hypercementosis. It is never a painful disorder, like the acronic type. No one will ever discover the slightest trace of uric acid in it. The case spoken of was one of hypercementosis, nothing more. I repeat that it is an anatomical impossibility for a tophus to form on the root of a tooth.

Dr. Rhein. What would you say if the examination showed phosphates and urates?

Dr. Nash. You never have nor ever will find uric acid in a hypercementosis. The acid may be found in the tartar that has been forced under the gums by mastication, if the gums are wounded and caused to bleed during meals, but not otherwise. This has given rise to the idea that such deposits of tartar were tophi, but a tophus on the root of a tooth has never yet been seen by any one.

Dr. Hill. How would you designate the pus discharges? How would you designate that disease?

Dr. Nash. It is an incident in only about half of the cases of alveolitis. The group should not, consequently, be termed pyorrhea alveolaris when there is present no such thing as suppuration. There is no trace of pyorrhea alveolaris in bismuth alveolitis at all. It is a designation which might be applied to the idiopathic cases, but it is a grave error to call a disease by the name of any one of its symptoms. Pyorrhea alveolaris is a symptom in about twenty diseases, a large portion of which do not come under the dentist's observation at all. There is a discharging of pus, and the teeth do not even loosen. It is so in cancerous conditions.

As to my book, which Dr. Rhein saw, the whole edition has been suppressed. It was written while I was ill, and when I came to look it over I found there was a great deal in it that was very objectionable. It has been thoroughly revised, and the new edition will soon appear.

Dr. Perry. Will you give an answer to the question whether these alveolar diseases are curable, or to what degree they are benefited by treatment?

Dr. Nash. I did not intend to speak about their therapeutics till the second volume of my book appears. It will contain the process of cure for nearly all of them. But in reply to the president I will say that of the twelve different diseases which come under the care of the dental surgeon, eleven of them are perfectly controllable, either by topical applications, the removal of accretions, or systemic treatment.

The only uncontrollable one is general, or marginal, hypercementosis. It is a disease seen in many old people. It begins by the deposit of soft milky or creamy tartar on the teeth, which does not harden, but it gives a thin line around the margin of the teeth. This tartar line disappears, and a hypercementosis takes place that gradually proceeds until the tooth is lost. I have never yet succeeded in checking its career.

Dr. Perry. You feel hopeful, then, in most cases?

Dr. Nash. I will guarantee to cure the variety which is generally thought to be the most obstinate of all with one application, if any of you will send me any such case that comes to you. This is the idiopathic type. It is perfectly controllable without destroying the nerve; nor is this necessary in any one of these diseases. I have not spoken of it before because in order to treat them successfully when complications are present, and these are very common, their etiology should be thoroughly understood. This part of their career forms the principal topic considered in the second volume of my book.

The PRESIDENT. I think it is the case with all of us that we have been more or less discouraged in the treatment of these cases, and we shall await the appearance of the second volume of your book with great interest.

Adjournment.

W. J. TURNER, M.D., D.D.S.,
Editor New York Odontological Society.

PENNSYLVANIA STATE DENTAL SOCIETY.

FOLLOWING is a list of the officers and standing committees of the Pennsylvania State Dental Society for 1899: Robert Huey, president; Henry Gerhart, first vice-president; S. B. Luckie, second vice-president; C. V. Kratzer, recording secretary; V. S. Jones, corresponding secretary; G. W. Klump, treasurer. Board of Censors, W. D. De Long, J. C. Hertz, C. M. Bordner, J. L. Fordham, H. W. Bohn. Council, R. Huey, C. V. Kratzer, V. S. Jones, G. W. Klump, *ex-officio;* G. L. S. Jameson, M. H. Cryer, H. N. Young (three years); J. A. Libby, H. C. Register, C. S. Beck (two years); I. N. Broomell, S. H. Guilford, H. S. Seip (one year). Executive Committee, H. C. Register, R. H. Nones, H. W. Arthur. Legislative Committee, G. W. Klump, J. A. Libby, A. S. Koser, W. E. Van Orsdel, Harry Beck. Enforcement of Dental Law, W. E. Van Orsdel, H. W. Bohn, H. E. Roberts. Clinic Committee, G. L. S. Jameson, W. D. De Long, G. L. Simpson. Exhibit Committee, F. D. Gardener, H. C. Register, J. E. Libby. Publication Committee, C. V. Kratzer, E. C. Kirk, Jas. Truman. Committee on Ethics, J. A. Libby, H. C. Register, I. N. Broomell. Examining Board nominees, G. W. Klump, H. E. Roberts, E. P. Kremer, J. A. Libby. The first named of each committee is its chairman.

C. V. KRATZER, *Rec. Sec'y.*

NATIONAL ASSOCIATION OF DENTAL EXAMINERS.

AT the annual meeting of the National Association of Dental Examiners, held at Niagara Falls, N. Y., Dr. C. C. Chittenden, of Madison, Wis., was elected president; Dr. A. C. McCurdy, of Baltimore, Md., vice-president; Dr. Charles A. Meeker, of Newark, N. J., secretary and treasurer, and Drs. John F. Dowsley, of Boston, Mass. (chairman), J. A. Hall, Collinsville, Ala., and James M. Keene, Medford, Ore., members of the College Committee.

The secretary most earnestly requests the officers of every state and territory to mail to him at an early date their revised lists of members of the several boards.

CHARLES A. MEEKER, *Sec'y.,*
29 Fulton st., Newark, N. J.

NEBRASKA STATE DENTAL ASSOCIATION.

THE annual meeting of the Nebraska State Dental Association was held in York, May 16-18, 1899. The officers elected were as follows: W. A. Ivory, Wayne, president; W. H. Sherraden, Omaha, vice-president; W. R. Clark, Seward, recording secretary; Leah Mills, Omaha, corresponding secretary; J. C. Cole, Norfolk, treasurer.

The next meeting will be held in Omaha, beginning the third Tuesday in May, 1900. LEAH MILLS, *Cor. Sec'y.*

MAINE DENTAL SOCIETY.

THE following officers were elected at the last meeting of the Maine Dental Society: A. W. Haskell, Brunswick, president; C. H. Haines, Dexter, vice-president; H. A. Kelley, Portland, secretary; E. J. Roberts, Augusta, treasurer; E. Bacon, Bar Mills, librarian. Executive Committee, E. C. Bryant, Pittsfield; W. S. Payson, Castine; L. S. Chilcott, Bangor; J. H. Lombard, Brunswick; W. G. Buswell, Foxcroft.

The next meeting will be held in Brunswick, on the third Tuesday and Wednesday of July, 1900. H. A. KELLEY, *Sec'y.*

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DENTAL SOCIETY ANNOUNCEMENTS.

UNION MEETING, SEVENTH AND EIGHTH DISTRICT DENTAL SOCIETIES, STATE OF NEW YORK.

THE thirty-second union meeting of the above societies will be held in the assembly room of the New Osburn House, Rochester, N. Y., Tuesday, Wednesday, and Thursday, October 24, 25, and 26, 1899.

PRELIMINARY ANNOUNCEMENT.

I. Cements. Dr. J. H. Beebee, Rochester.
II. Subject to be announced. Dr. J. Wright Beach, Buffalo.
III. Cosmetic Dentistry. Prof. Chas. H. Ward, Rochester.
IV. Subject to be announced. Dr. W. A. Barrows, Buffalo.
V. Treatment of Fractures of Lower Maxilla. Dr. Frank Greene, Geneva.
VI. Subject to be announced. Dr. S. E. McDougall, Buffalo.
VII. Anesthetics in Dental Practice. Dr. J. F. Knapp, Geneva.
VIII. Subject to be announced. Dr. Preston, Buffalo.
IX. The Use and Limitations of Formaldehyd in Dentistry. Dr. F. W. Low, Buffalo.
X. Subject to be announced. Dr. R. H. Hofheinz, Rochester.
XI. The Embryological Development of the Dental Tissues. Dr. W. C. Barrett, Buffalo.
XII. Subject to be announced. Dr. Leroy Requa, Rochester.
XIII. Articulation. Dr. Geo. B. Snow, Buffalo.
XIV. Subject to be announced. Dr. W. H. Povall, Mt. Morris.
XV. Subject to be announced. Dr. C. H. Nicholson, Rochester.

The committee have under arrangement other important additions. There will be clinics in abundance, together with a complete dental exhibit. The committee are making strenuous efforts to make this one of the best union meetings ever held by the society, and well worthy of your attendance. Members of the profession are cordially invited.

WM. W. BELCHER, *Chairman,*
827 Granite Building, Rochester, N. Y.

MASSACHUSETTS BOARD OF REGISTRATION IN DENTISTRY.

A MEETING of the Massachusetts Board of Registration in Dentistry, for the examination of candidates, will be held in Boston, Monday, November 13, 1899, at 9.30 A.M., at Harvard Dental Infirmary, North Grove street.

Examination in operative dentistry at 10.30 o'clock.

Each candidate must come prepared with rubber-dam, gold, and instruments, to demonstrate his skill in operative dentistry. Any one who wishes may bring his patient. So far as possible patients will be furnished.

The theoretic examination will include operative dentistry, prosthetic dentistry, crown- and bridge-work, orthodontia, anatomy, histology, surgery, pathology, materia medica, therapeutics, physiology and anesthesia, and will be held at Civil Service Rooms, State House, commencing Tuesday, November 14, at 9.30 o'clock.

All applications, together with the fee of twenty dollars, must be filed with the secretary of the board on or before November 6, as no application for this meeting will be received after that date.

Candidates who have taken an examination and desire to come before the board again at this meeting must notify the secretary as above in order to be registered.

G. E. MITCHELL, D.D.S., *Secretary,*
25 Merrimack street, Haverhill, Mass.

NEW HAMPSHIRE DENTAL SOCIETY.

THE New Hampshire Dental Society will hold its next annual meeting at the New Manchester House, Manchester, N. H., November 14, 15, and 16, 1899.

F. F. FISHER, *Secretary,*
913 Elm street, Manchester, N. H.

NORTHERN ILLINOIS DENTAL SOCIETY.

THE Northern Illinois Dental Society meets in Elgin, Ill., Wednesday and Thursday, October 18 and 19, 1899. A good program is in course of preparation, and all dentists of Northern Illinois are requested to be present, as a reorganization of the society is contemplated.

JAMES W. CORMANY, *Secretary.*
Mt. Carroll, Ill.

EDITORIAL.

"CROWN COMPANY AGAIN IN OPERATION."

THE editor of the *Dental Digest* publishes in the August number of that journal his account of the revival of litigation upon the part of the International Tooth Crown Company, which has resulted in the handing down of a decision favorable to their interests by Judge Townsend, of New York, in the United States Circuit Court.

We quote such portions of Dr. Crouse's editorial as pertain to the facts, for the reason that in that connection he is entitled to speak with authority. He says,—

> "The profession are probably aware of the recent decision in favor of the Crown Company in New York, for the daily newspapers of this country have given wide publicity to the affair. As these reports are full of inaccuracies, and as we are overwhelmed with inquiries from all over the country, we think it well to give a brief synopsis of the whole question so that our readers may know what to expect.
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> "To begin with, the International Tooth Crown Company had originally secured a decision by the highest court in the southern district of New York, declaring some of the various patents on crowns and bridges valid. With these decisions in their favor, as you may remember, eleven years ago they started through the country securing licenses and collecting royalty, the terms imposed being twenty-five dollars ($25) per year license fee and fifteen per cent. (15%) on all work done. Those signing a license agreed thereby to the validity of some thirty-eight different patents which the Crown Company had secured on various devices.
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> "At this stage of the proceedings the Dental Protective Association was organized, and within six weeks it had stopped the Crown Company from enforcing their patent claims. The association drove them from one court to another, they withdrawing and paying costs rather than make a test case, until they reached the Federal district in which they had previously obtained their favorable decision. It was here in 1896 that the association succeeded in having the former decision of these courts reversed, and the Low bridge patent declared invalid; first before the Federal judge in the Circuit Court, and afterward in the United States Court of Appeals. This supposedly to all intents and purposes ended the litigation with the Crown Company. It did not, however, for they reorganized and secured in their company individuals of large means, and their efforts were exerted to get a reversal of our decision, on the ground that they had had a favorable decision on their patents at one time, and at the second contest they had been reversed, and so they were entitled to a third hearing. We have known all this and have urged repeatedly that this action was being taken by the Crown Company; and we predicted that just the results that have taken place would transpire, namely, that the Crown Company would get a decision in their favor because there was no adequate defense being made. Bear in mind, the defendant was a relative of persons connected with the Crown Company and not a member of our association; therefore *the Protective Association has not been represented in any way in the recent suit.*

"The Crown Company have their decision, rendered by Judge Townsend, July 31, and it practically overrules or reverses the former one which declared the patent invalid. With this to back them they are already actively at work. So far as we can learn they are confining their operations at present to the state of New York. Letters have been written by the Crown Company's attorneys to dentists in New York state, urging them to settle at once if they wish to avoid trouble; legal action has been instituted, and a thorough canvass is being made of the whole state, all towns being visited. Last week in Auburn they induced every dentist to contribute much more than it would have cost him to join the Protective Association; and according to the *Syracuse Herald,* on August 18 they extorted one thousand dollars from the seven dentists in the town of Geneva. Many other instances might be cited, but enough has been said to show the gravity of the situation. We have no doubt that the Crown Company will intimidate the dental profession who are not members of the Protective Association into paying them several million dollars.

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"The Protective Association harbors no ill-will for the indecision and apathy of the profession, and stands ready at the present time to enroll all those who wish to join. In spite of the enormous expenditure of time and energy necessary to the successful carrying out of this litigation, which will be even more complicated and taxing in the future than in the past, and in spite of the fact that the chairman, although doing all this work without compensation, is subjected to slander and abuse as well, he is ready and willing to continue the work if the profession so desire. We speak advisedly when we state that every practitioner who unites with this organization will be taken care of and be protected against any claims for royalty. The present state of affairs is a good illustration of the need of organized effort. What would become of the practicing dentists of this country to-day were the power of the Crown Company unchecked by the influence of the association? Is it not time the dental profession realized who are their true friends?"

There is much of the editorial which we do not republish, for the reason that in a number of instances his statements are of so altogether an erroneous character and evince so much bias of feeling that in the judgment of the editor of this journal they tend to defeat rather than strengthen the cause he is advocating.

The issue, as we understand it, is as to the validity of certain patents covering processes for crown- and bridge-work. The question has been already tested in the courts, and in certain cases, through the indefatigable energy of Dr. Crouse, the claims of certain of the patent owners have been disproven, but it would seem that the case is not yet finally closed.

Dr. Crouse asserts that membership in the Dental Protective Association is and has been sufficient safeguard against the unjust claims of those holding patents the validity of which is a matter of question. He further promises protection from the kind of prosecution noted to all who join the Dental Protective Association. It is but a small matter to put his promise to a test; the loss in any event would be but small, while the possible advantages would be greater than the average practitioner could afford to ignore. Why not take him at his word?

ALKALINE DENTAL CARIES.

WE publish elsewhere in this issue an article by Dr. S. A. Hopkins which is a preliminary report of the results of his investigations as to the etiology of dental caries. The article is important in certain respects, and one which demands consideration. Two of his deductions are especially striking. First he finds experimentally that lactic acid minus bacteria failed to produce caries of tooth-structure, and second, he finds that caries can be artificially produced through bacterial agency in a culture-medium which gives an alkaline reaction to test papers; from which latter observation he deduces the probability that "an acid is not essential to the carious process in dentin." A critical examination of the steps by which this rather startling statement has been reached arouses the suspicion that all of the possible factors in his line of experimentation have not been fully considered before announcing the result.

It will be seen that the culture-medium principally used was a one per cent. glucose bouillon, or, where other media were employed, they were such as contained carbohydrate material to a considerable amount.

No observer in this department of bacteriological research has, so far as we are aware, shown that the fermentation of carbohydrates resulted in the formation of alkaline end products.

On the other hand, it has been demonstrated beyond reasonable doubt by Miller that the formation of lactic acid by the fermentation of carbohydrates through the agency of certain bacterial forms is the essential feature of the carious process in tooth-structure.

Again, it is well known that dilute alkalies are without power to disintegrate tooth-structure, while it is equally well known that the action of even dilute lactic acid will bring about separation of the enamel-prisms and, if long continued, disintegration of both enamel and dentin.

These facts should be taken into consideration at their full value before it can be accepted as even probable "that an acid is not essential to the carious process in dentin."

The one per cent. of glucose in the culture-media employed in the experiments under consideration furnished an ample amount of carbohydrate pabulum for the formation of all the lactic acid necessary to the establishment of the carious process as now generally accepted. The general alkalinity of the culture-medium is a condition by no means incompatible with the local production of lactic acid at the carious point. On the contrary, the localization of the acid and a neutral or alkaline saliva is necessarily a constant feature of the normal carious process in tooth-structure. A general high acidity of the medium would in itself terminate the process, as the experiments of Dr. Hopkins show, he having been unable to produce the acid beyond one-half of one per cent. A further evidence of the localization of the lactic acid in dental caries is that immediately upon its formation it is neutralized by combination with the calcium salts of the tooth-structure, upon which it acts as a disintegrating agent.

The analogy of the action of the lactic acid of caries to the commercial production of lactic acid is of interest in this connection. In the commercial manufacture of lactic acid it has been found necessary to maintain a constant source of alkaline or basic supply to neutralize the acid as rapidly as it is formed, otherwise the process of acid formation ceases spontaneously when the surrounding menstruum reaches a certain low percentage of acidity. A like neutralization of the acid in the manner stated is an essential feature of the carious process, and a sufficient explanation of the general alkalinity of the surrounding medium, both under the artificial conditions of laboratory research, as reported by Dr. Hopkins, and clinically, for it has been generally observed that caries proceeds often with great rapidity in mouths the saliva of which gives a distinctly alkaline reaction.

The possibility of dental caries "without the presence of acid" has been suggested by Arkövy in his Untersuchungen über die Pathologie und Therapie des Abscessus Alveolaris Chronicus" (*Vierteljahrsschrift für Zahnheilkunde,* April and July, 1898), and quoted by Söderberg (DENTAL COSMOS, August, 1899, p. 768). The error of deduction in the case of Arkövy's observation has, we think, been pointed out by J. Leon Williams in this issue of the DENTAL COSMOS, page 1043.

It may in time be shown that "an acid is not essential to the carious process in dentin," but the reported experiments under consideration scarcely warrant the suggestion that an alkali is actively concerned in the process excepting secondarily and remotely, as noted. The research is interesting in itself as far as it goes, but as to the main conclusion the verdict, based upon the evidence at hand, is likely to be the Scotch one of "Not proven."

UNIFICATION OF DENTAL LEGISLATION.

SIXTEEN years ago the National Association of Dental Examiners was organized at Niagara Falls, and at its first meeting adopted the draft of a dental law which by resolution it recommended to the different states for enactment; and it was further resolved, "That this association furnish all state societies with copies of a well-digested law, *so that uniformity in legislation, as far as practicable, may be attained.*"

At its last annual meeting the association again considered the question of unification of dental legislation, which by Article II of its constitution is one of its objects, and again submitted a draft of a law in furtherance of its avowed purpose.

The report of the committee and the suggested law are published in full in this issue.

Even at the risk of criticism for monotonous repetition, we again assert our conviction that no question before the dental profession at this time is of such vital importance as dental legislation. The elevation of educational standards and the improvement of technical dental training are intimately connected with it. It is the means by which the best interests of dentistry are safeguarded by the powerful aid of the state, and when intelligently and properly employed the bulwark of the profession and society at large against ignorance and incompetence in dental practice.

That it has not accomplished heretofore all that has been expected of it, that much of it has been defective, that it has occasionally been detrimental rather than helpful to professional progress, are faults chargeable alone to its method of application, and not to the principle involved in the thing itself.

It is impossible in the evolution of the subject that mistakes could have been wholly avoided, but it would seem that the time is near at hand, if indeed it has not arrived, when active work upon broad lines can be undertaken which will result in harmonizing and so unifying our views on the subject that the dental laws of the several states may be brought more nearly into accord, at least with respect to their essential features.

Action upon the proposed law submitted by the National Association of Dental Examiners has very wisely and judiciously been postponed until the next annual meeting. Time is therefore given in which all interested may have an opportunity to study its provisions and form an opinion concerning them.

We ask for a thoughtful consideration and criticism of the suggested law, and shall be glad to receive individual expressions of opinion as to any or all of its features, so that later we may present to our readers a critical analysis of the whole matter, and thus aid as far as possible the effort now definitely shaping itself toward the unification of our state dental laws.

DR. W. G. A. BONWILL.

THE dental profession throughout the world will learn with deep regret of the death of Dr. W. G. A. Bonwill, which occurred at St. Joseph's Hospital, Philadelphia, Pa., on Sunday, September 24.

Dr. Bonwill was taken ill while on his way to attend the annual meetings at Niagara Falls, and as a consequence was removed to Clifton Springs (New York) Sanitarium; but was subsequently taken to the Presbyterian Hospital, Philadelphia, where he for a brief period seemed to be improving. Later it was deemed necessary to perform a surgical operation, and for that purpose he was transferred to St. Joseph's Hospital, where he underwent an operation about a week ago. He failed to obtain relief, however, and gradually sank until his death from uremic poisoning.

The announcement of his death comes too late for fuller notice in this issue, but an extended account of his interesting career and services to the dental profession will appear in the November DENTAL COSMOS.

LAID OVER.

OWING to delay in receiving electrotype illustrations from London, the first of an important series of articles on Ceramic Art in Dentistry, by Dr. J. Leon Williams, is unavoidably laid over until our November issue.

BIBLIOGRAPHICAL.

CHRONIC ALVEOLITIS. ITS CAUSES, CLINICAL HISTORY, AND TREATMENT. WITH GENERAL DIRECTIONS FOR THE CARE OF THE TEETH. New and revised edition. By Dr. HENRY S. NASH, New York. In two volumes (Volume First). F. Schleuning, Publisher, New York, 1899.

The first edition of this work was noticed in this journal upon its appearance. The edition was promptly withdrawn, owing to a number of errors which the work contained, and which had been overlooked by the author. The present issue is a revision which we understand to be in harmony with the author's ideas.

The work comes too late for extended notice in this issue, but will be fully reviewed in the November DENTAL COSMOS.

PERISCOPE.

Bacteria and Dental Caries. (Preliminary Report.)—This work was undertaken to discover, if possible, the causes which lead to dental caries. It seemed reasonable to hope that if the various processes of tooth-decay could be accurately followed, some suggestion for preventing or at least retarding the process might arise.

There have been many theories promulgated to account for the destruction of the teeth, and it is unnecessary to review them all.

Up to ten or fifteen years ago the theory generally received was that which ascribed to chemical action alone the destructive changes which take place in the human teeth. About that time, Miller, of Berlin, who did excellent work in the study of the bacteria of the human mouth, found, as he believed, that the destruction of the human teeth was an acid process due to the action of lactic acid. This lactic acid, he believed, was produced by bacteria which found a suitable media for their development in the food particles which remained in the mouth after eating, and which became mixed with broken-down epithelial cells and saliva. This was generally known as the chemico-bacterial theory, and is the theory almost universally held at the present time.

The notable differences which were seen to occur in the action of the destructive agents upon teeth in different mouths and upon different teeth in the same mouth were supposed to be due to differences in the structure of teeth which made some teeth much more resistant to caries than others.

Three or four years ago Dr. Black, of Illinois, conducted a series of experiments which must have been as laborious in character as they were surprising in results. He subjected a very large number of extracted teeth to a very great variety of tests. He measured their specific gravity, subjected them to various pressure tests, made microscopical examinations of sections, and subjected them to analysis to find out the proportion of lime-salts and other substances of which the teeth were composed.

At the end of his experiments he surprised the world with the astonishing statement that practically no physical differences were shown in the teeth examined that could throw any light on the question of the susceptibility of teeth to caries. He allowed the inference to be drawn that so-called poor teeth did not differ materially from those which were usually characterized as strong. He concluded that the destruction of teeth was due to environment alone, and that no differences in strength could be considered an important factor in the carious process.

To the credit of the dental profession be it said, these conclusions have not been received without question, and the idea of susceptibility and immunity still has its supporters.

When the present work was undertaken it was with the hope of determining, first, whether caries was due simply to the presence of lactic or some other acid, and was a chemical process in which bacteria were merely producers of the chemical agent, or a more direct action of one or more forms of the bacteria found in the mouth. Second, whether the same agents acted on the enamel and dentin alike. Third, whether teeth from one mouth were more resistant to these influences than teeth from another.

It seemed to us that in these experiments we could not do better than follow the laws which Koch has laid down to govern investigations of diseases of supposed bacteriological origin.

For the fulfillment of the first law,—viz, to establish the constant presence of the forms we are using,—cover-glass preparations are constantly made from the mouths of patients, and records are kept of the age, sex, and physical condition of the patient and of the condition of the teeth. At the same time cultures are constantly being made with the object of obtaining as many pure cultures as possible for use in these experiments. About forty forms have been isolated in pure cultures by Dr. Coolidge, who has been associated with me in this work, and to whom I am greatly indebted; and while many of these cultures are repeatedly found in the mouths examined, we have found adequate descriptions of but a comparatively small number in the text-books on the subject.

Many of the forms seen in cover-glass preparations, especially the spirilla and leptothrix forms, we have as yet failed to cultivate, and it is possible that some of the most important destructive changes may be induced by these micro-organisms which have thus far baffled all attempts to cultivate them.

After establishing the frequent or constant presence of a micro-organism in the mouth, and then having secured a pure culture of the form, the third step in the work is to produce the disease. For the fulfillment of this part of the work the method is somewhat as follows: I have placed myself in communication with a number of extracting establishments in this and neighboring cities, and have freshly-extracted teeth sent to me nearly every day. Notes are made of the age of the patient and of the general condition of the teeth in the mouth from which they were extracted. These teeth are cleaned and filled by an assistant, who then drills through the enamel in one place and exposes the dentin. In another spot the enamel is roughened with a file, so that we have three points of observation on a single tooth,—viz, the uninjured enamel, the bruised or cut enamel, and the dentin. After thorough sterilization, three teeth treated as I have indicated are put into the same tube,—one so-called strong tooth, one frail tooth, and one of average texture, as indicated by the condition of the mouth from which they came,—so that besides the three points of observation on each tooth we have three different classes of teeth to observe.

Of course we realize perfectly that an extracted tooth may not fulfill the conditions of a living tooth in the mouth, and we may find in this another cause of failure, but thus far we have been surprised to see how nearly the changes which occur in these teeth coincide with the action which takes place in the mouth as we see it clinically.

The tubes containing teeth treated as I have indicated and containing also one per cent. glucose bouillon are then inoculated. We have fixed upon one per cent. glucose bouillon as the most convenient and satisfactory variety of media, although we do not confine ourselves to that alone, frequently employing potato, liquid serum, and various saliva mixtures.

Of the many forms isolated from the mouth I should say at least one-fifth of the number are producers of lactic acid, but the strongest acid we have yet produced is one-half of one per cent. I am indebted to Dr. Charles Harrington for the chemical analysis and for other information on this subject.

Besides these lactic-acid producers there are other forms which cause a strong alkaline reaction, and cultures of these are also used to inoculate the tubes containing teeth.

After inoculation the tubes are placed in the incubator, and from time to time fresh culture-medium is added and the reaction of the tubes tested. Cultures are also made from time to time in order to determine that no contaminations have crept in and that the original micro-organism is still active. In many cases we have found that the micro-organism was destroyed by the fermentation which it produced. Frequent renewal of the culture-medium will usually prevent this.

It is probable that lactic acid of the strength of one-half of one per cent. is never present in the mouth, since it is found that in the majority of cases where dental caries is going on rapidly the saliva has a marked alkaline reaction, and that there is a great deal of it. It is possible that the irritation caused by the caries may increase the action of the salivary glands. The alkalinity of the saliva is usually more marked in these cases than in those mouths in which the carious process is absent. For control tubes we use sterilized saliva, commercial lactic acid reduced to a strength of one-half of one per cent., and the bouillon rendered acid or alkaline by the mouth forms and afterward sterilized.

From these experiments we have not been able to deduce any definite laws or point to very positive results. From the fact that teeth subjected to one-half per cent. lactic acid in control tubes for four months show no carious action, it may be inferred that something more than the mere presence of the acid is necessary to bring about the change. The fact that artificial caries takes place in the dentin of teeth in tubes having a constant alkaline reaction points to the probability that an acid is not essential to the carious process in dentin. The fact that some teeth in these tubes were not acted upon, while others treated in the same way and contained in the same tube showed positive results, points to the probability that some teeth are much more resistant than others.—*S. A. Hopkins, M.D. (From the Bacteriological Laboratory of the Harvard Medical School.) Journal of the Boston Society of Medical Sciences.*

THE AMERICAN DENTIST OF THE PRESENT DAY.—The art of dentistry is well known to have had its real origin in the United States. But it is not as a skilled and ingenious workman alone, or even chiefly, that the American dentist is to be regarded; he occupies a place second to nobody else's as a scientific investigator. If he takes up his abode in some European city—and he often does—it is not merely for the ingenuity displayed in the appliances he takes with him from his native land that he is distinguished; he soon makes it understood that he is practicing for the love of his art, and that he is at the same time seeking by unsurpassed methods of scientific study to advance odontological science. Whoever of the medical profession may be unaware of this would lose nothing by attending a few meetings of the New York Odontological Society; indeed, he would probably pick up information that he might find of advantage in his own work. We mention that particular society simply because it is one of which we have knowledge founded on observation, and not because we imagine there are not other dental societies in the country that might serve as equally noteworthy examples of the progressive character of the dentist's work and the high position of odontology among the medical sciences; indeed, our present reflections have been prompted by a paper presented before the Section in Stomatology (a term, by the way, which we do not approve of) of the American Medical Association at the recent Columbus meeting, by Dr. Frederick B. Noyes, of Chicago, and published in the *Journal of the American Medical Association* for August 5.

Dr. Noyes's paper was the outcome of a most painstaking histological study of the periodontal membrane, one fraught with exceptional technical difficulties, as the author explains. It is illustrated with fine half-tone reproductions of photo-micrographs and a diagram of Dr. G. V. Black's. Unfortunately, the cuts are not numbered, though they are referred to by number in the text. Such an occurrence will occasionally mar the publication of an important article; the rush attending the preparation of a large weekly journal is such a tax on the editorial staff that nobody can justly be blamed for it, and certainly we should be the last to cast a stone at our excellent contemporary for a blemish which, after all, is probably to be imputed to the author's omission, impossible to repair if noticed at the last moment, and apt not to be noticed at all till the paper comes out. Like things have occurred in our own pages, and we do not expect to escape them so long as human faculties are finite.

Dr. Noyes's article is of value, not only by reason of the observations recorded in it, but also for the suggestions the author offers as to solving the problems that still confront the histologist with reference to certain epithelial structures found in the periodontal membrane, and for his criticism of argument that ought to be founded on histology, but has come with profusion from men who admit they have not made a histological study of the structures concerning the diseases of which they discourse. In other words, it is as an incentive to further work on the part of his fellow-dentists that Dr. Noyes's paper is sure to prove of great value, for they are far too devoted to the advancement of odontology not to heed what he says. Admirable as their every-day work is, as recently exemplified in perfecting dental anesthesia and in the use of porcelain fillings, it is subordinate to their intelligent and unremitting pursuit of the science that underlies their art. The American dentist of the present day is most assuredly in the advance guard of scientific progress.—*New York Medical Journal.*

A MONTHLY BIBLIOGRAPHY OF DENTAL LITERATURE.

COMPILED BY J. MELVIN LAMB, M.D., D.D.S., WASHINGTON, D. C.

The abbreviations of titles used are those common to bibliographical work, and will, it is presumed, be readily comprehended by any one familiar with dental or scientific publications. Any explanation will be gladly furnished by the compiler. A star (*) indicates a thesis.

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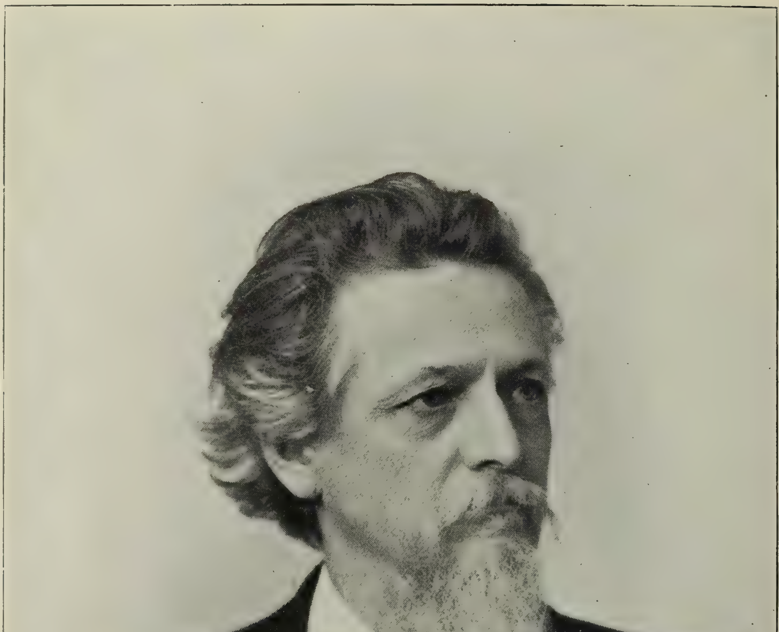
LIST OF UNITED STATES PATENTS

PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING AUGUST, 1899.

Aug. 8.—No. 630,650, to Seth A. Brown. Vulcanizer.
" *22.*—No. 631,429, to James Neil, Jr. Artificial tooth.
" " No. 631,509, to Samuel F. Nichols. Hand drill.



Wm. G. A. Bonwill

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ORIGINAL COMMUNICATIONS.

CERAMIC ART IN THE RESTORATION OF HUMAN TEETH.

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INTRODUCTION.

ACCEPTING Plato's ideas on art and the beautiful as containing what is fundamentally true, it must be admitted that there is very much that is false and vulgar in the prevailing notions of the present time on these matters. If a perception of the artistic, the beautiful, consist essentially in a recognition of certain inherent laws of harmony existing between man, the microcosm, and that which is not man, the universe, the macrocosm, then it must be essentially true that all real art, all real perception of the beautiful, has an intimate, one might say an organic, relation to life. In truth, the Platonic view is that all of the arts are but different phases of, and are contributory to, the one great art of right living, or living in accordance with those harmonious laws existing between man and his environment. Art thus becomes the arrangement and application of principles discovered by scientific investigation. And this view, which is essentially the Platonic view, I hold to be the correct one. All false art is chiefly characterized by its severance from the real lives of the people displaying it. When art becomes ostentatious, when it is used solely as a medium for the display of wealth, when its forms are employed by those who understand but little of the harmonies of correct relation, it ceases to be real art and becomes art so called, a mere caricature. All great art is chiefly characterized by its harmonious display of variations upon some simple theme or idea. This is seen to be true of all great architecture, great music, and great literature. All art is imitative, and is good or bad in accordance with the nature of its models or ideals. The world of art is a kind of selected reflection of the real world, or nature. The genius of the artist lies largely in his power to select that which is most fit to represent the ideal in his mind.

Accepting these propositions as brief statements of what is most fundamental in art, let us inquire to what extent the principles involved in these statements have been adopted in the so-called art of dentistry. The art of dentistry has for its chief object the restoration of natural teeth that have become defective through dental caries, and the replacement of artificial substitutes for these natural teeth when they are entirely lost.

Up to the present time no substance has ever been introduced for the purpose of stopping or filling the cavities in natural teeth caused by the process of decay which can in any sense be said to produce an artistic result. The substance most in favor among the best dentists for this purpose is gold. In the most skillful hands its utilitarian qualities cannot be denied, but the results of its use, from the esthetic point of view, are the very opposite of artistic. Instead of restoring a lost harmony, it loudly advertises a defect. It announces in the most glaring manner possible that disease has been here, followed by the dentist. The rule so generally followed, especially in the United States, of placing gold in the most conspicuous cavities of decay in the front teeth, while less conspicuous and often more temporary materials are used for those cavities not in evidence to the ordinary observer, is a blatant defiance of all that is best and most refined in art. The proper place for gold to be used as a filling-material for decayed teeth is in those situations where it is *least* likely to be seen. Here its utilitarian qualities may be made the most of without severely shocking the artistic sense. The same objections apply, to a greater or less extent, to all other materials which have been used up to the present time for stopping the anterior or front teeth. The material is not in artistic harmony with its surroundings, and so offends the cultured eye. That these materials are not more offensive than they seem to be to many people is merely a proof that the majority are not very sensitive to their inartistic nature. It is not only good Platonic philosophy, but good modern scientific philosophy, to say that we are what we are largely by virtue of our environment. That to which we are most accustomed becomes most a part of our natures. Scars and deformities of most of the features of the face are the exception and not the rule, and we are, therefore, not sufficiently accustomed to these defects to be otherwise than shocked by them. And so it would be with glittering gold fillings in the teeth if our artistic sense had not become deadened by long abuse.

And when we turn to that phase of the so-called art of dentistry which is concerned with the making and inserting in the mouth of artificial substitutes for the natural teeth, we may make our indictment for offense against all true art even stronger than we have in the process of filling teeth. We see in a very large proportion of the cases of artificial teeth inserted a crude display of cheap mechanics. Of good art there is none, or next to none, in the great majority of artificial dentures constructed. In all branches of art, emphasis of the obvious is the most unforgivable fault. In the making of artificial teeth the obvious is generally emphasized to the extreme degree. The most patent feature of these artificial dentures is the fact that they *are artificial.* So artificial or so *false* are they that they catch and hold the cultivated eye with an exasperating insistence. They overwhelm and outdazzle all of the other features of the face to such an extent that in passing a person on the street one often is aware of hardly more than a moving set of teeth. That harmony which is the first essential of all good art is totally wanting. The teeth bear no artistic relation to the rest of the features. The most common fault is that of placing young teeth in an old face. But many other glaring faults of size, color, and position are in evidence. Several reasons or explanations lie at the root of all this bad art in dentistry. First among these we should place lack of thorough training of the dental student in closeness and accuracy of observation. Some of the dental colleges in America have introduced as a part of the curriculum the carving of teeth in ivory or bone, using natural teeth as models. This I regard as an extremely important feature of manipulative and esthetic training. If this method be reduced to a system and thoroughly carried out, it is certain to produce most gratifying results. It combines in the happiest manner that training of eye and hand so essential to the production of a work of art. It educates the student in all of those slightest variations and peculiarities of form in natural teeth which are so seldom imitated in most of the artificial teeth made. If any dental student of average ability would devote one year to a close study of the shapes, colors, and arrangements of natural teeth, and the relations of shape, color, and arrangement to contour of face and color of hair and eyes, he might astonish the dental world in the artistic excellence of his productions in artificial teeth. You may count on the fingers of your two hands all of the real artists in the making of artificial teeth in the world to-day, and even these have not yet got within sight of what is still possible in this field. I have no patience with the men who are constantly harping on the old tune of our wonderful progress in all dental matters, our wonderful cleverness and skill in all departments of dentistry. Where is the dentist who possesses a small fraction of the art, knowledge, and manipulative skill displayed, let us say, by a Japanese worker in ivory, porcelain, cloisonné, or bronze? And yet there is ample opportunity in the construction of artificial dentures for the display of knowledge and skill of an order not below that shown by the Japanese artist. I would say to any dental student, here is a great, open field for you. Neglect no opportunity which may be presented of securing a photograph of a face showing a good natural set of teeth. Take impressions and make models of these teeth, and label them to correspond with the photographs. When you have secured a considerable collection you may begin to arrange them in groups. Certain specimens will be more or less typical of certain racial characteristics or temperaments. Other specimens will show the results of the mixing of races and temperaments. No classification of human teeth worthy of attention has yet been made, especially with reference to facial contour. Any student taking this work up and perfecting himself in it would in a few years find himself with a world-wide reputation, and with all the demand for his services that he could entertain.

And this statement brings me to another phase of my criticism,—viz, public appreciation of dental art knowledge and skill. It is, I regret to say, undeniably true that this appreciation is at rather a low point. But this is much more the fault of the dental profession than of the public. How can the public be expected to possess a fine critical knowledge of the artistic merits of artificial teeth when the really artistic productions are so few and far between? Every important artist finds it necessary to educate his public to a great extent. And so it will be with art in dentistry. We must first have the artists, and then the public must be educated to appreciate their work. Patients must be made to see how essentially inartistic it is to insert small, even, white teeth in all mouths. The harmony existing between tooth form, color, and position and facial contour and complexion must be carefully and patiently pointed out. Above all, a firm stand must be taken against that unreasonableness and bad taste on the part of many wealthy people who spend money freely to decorate their persons with costly dress and jewels and their houses with expensive furniture and bric-a-brac, and yet haggle over the cost of a work of art for their mouths, a thing which is to become a far more intimate part and parcel of their person than dress or jewels. The dentist must insist upon at least as much consideration in this respect as is bestowed upon the ladies' tailor, the gem-setter, or the painter of pictures. And if he be a real artist he will not have much difficulty in doing this. He may even, after a time, find wealthy connoisseurs competing for his art productions as they now do for those of their favorite artists in other fields. When the public shall have discovered, through effects produced which may be seen, what power the dental artist has to improve, as well as to degrade and deform, the human countenance as is now so frequently done, the cheap dentist and the limited dental company will become things of the past.

Some of the Artistic Possibilities of Porcelain in Restoring Decayed Teeth.

Methods of Manipulation and Results.

The use of glass and porcelain as a stopping or filling-material or inlay for cavities of decay in the teeth has been in the experimental stage for a number of years. These materials have been taken up and discarded by many because of certain technical defects. The glasses or glass-like porcelains first introduced were too friable and too porous. They were easily broken, and they did not retain their original color. But with the introduction of the Jenkins porcelains, and the many others with a still higher melting point which have recently been produced, the objection to the earlier porcelains has been entirely overcome. In point of durability it may be doubtful whether porcelain fillings will reach the standard set by gold in the hands of a few of the finest operators, but I believe they will prove more uniformly successful, and that their durability will show a higher general average. The difficulties in manipulating porcelain for this use are, in my judgment, not greater than those which have to be faced in order to produce fairly good results with gold. But being an entirely new process, failures may be expected at first. It would be well for those taking up this method to begin by preparing inlays for cavities made in ivory or extracted teeth. A dozen such experiments with cavities of various shapes would fit one to begin with the simpler forms of cavities in the mouth.

The Jenkins outfit for inlay work is the most elaborate that has yet been offered. It contains a great variety of shades, and the porcelain is easily melted; but this last-mentioned quality may be considered of doubtful value. It has been said that this porcelain shrinks less than others, but I have devised a method of manipulation which makes this a matter of no consequence whatever, and, moreover, I believe the question of shrinkage is almost entirely one of fineness or coarseness of the body used. If the porcelains supplied by other firms were as finely ground as is the Jenkins, they probably would not show any greater shrinkage. The great expense of the Jenkins outfit would deter many from taking up porcelain work, and it is therefore fortunate that materials in no way inferior to those supplied with the more expensive outfit may be obtained for a very moderate price. The electric furnace is so vastly superior to a gas furnace from every point of view that it should always be used when possible. Messrs. Ash & Sons supply a small furnace, shown in Fig. 1, admirably adapted for this work. I have also used a small furnace sold by the Detroit Dental Manufacturing Company for several years. This furnace has been heated several hundred times, and still shows no signs of failure or defect.

As is now probably generally well known to most of the profession, the making and inserting of a porcelain inlay consists of the following steps: The preparation of the cavity; the adapting of the platinum or gold form, in which the porcelain is baked or melted, to this cavity; the investment of the platinum or gold form; the packing and melting of the porcelain powder or paste; and, finally, the removal of the platinum or gold and the cementing of the inlay into the cavity. Let us consider the proper manipulations involved in each of these steps as mentioned. The simplest form of cavity to deal with is shown in Fig. 2, at *a*; that is to say, a cavity which everywhere has flaring, opposite walls,—a simple hole in the tooth. In the first place, the cavity as prepared should never present a round orifice. When this is the case it is impossible to tell quickly which way the porcelain inlay is to be inserted. The cavity should be oblong or oval, and slightly larger at one end than at the other. One can then see instantly which way the porcelain should be inserted, and this is an important matter when fairly quick-setting cements are used. In this simple form of cavity there should be no undercuts, and the orifice should be slightly larger than the bottom of the cavity. The edge of the cavity should be sharp and well defined. Beveled margins should always be avoided to the greatest possible extent. Carefully polished margins of cavities are very important, and the instruments best adapted for accomplishing this

FIG. 1.

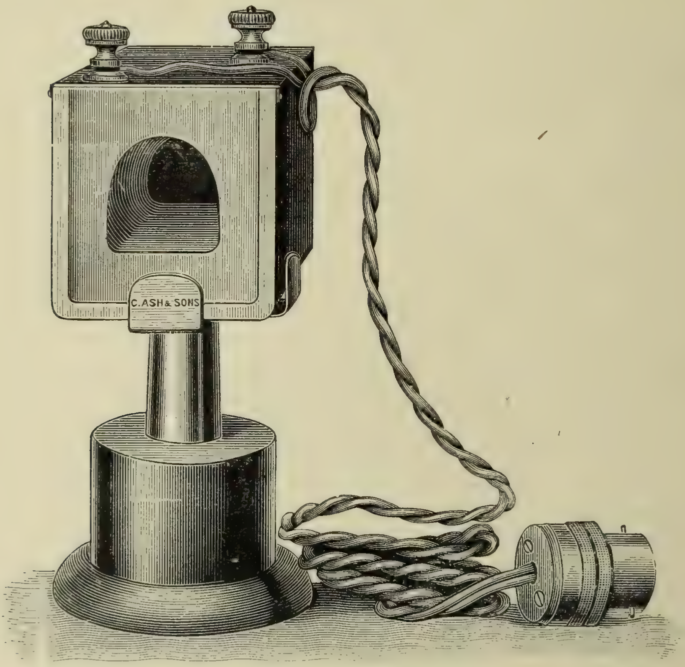
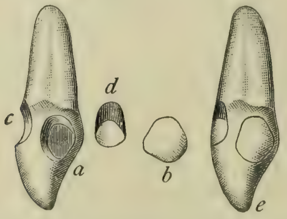
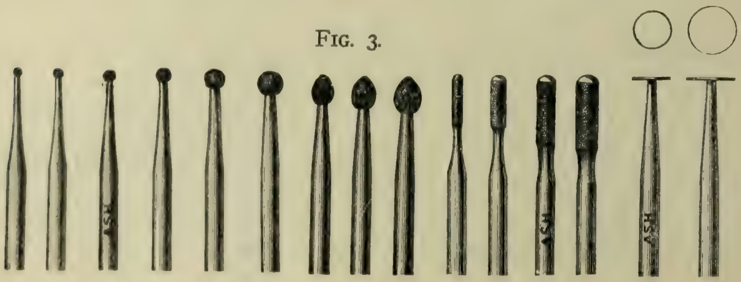


FIG. 2.



Showing a cuspid tooth with an approximal and a labial cavity prepared for inlays. *b*, porcelain inlay for approximal cavity; *d*, porcelain inlay for labial cavity, with pink porcelain at upper margin to restore gum lost by absorption; *e*, same tooth with inlays in place.

FIG. 3.

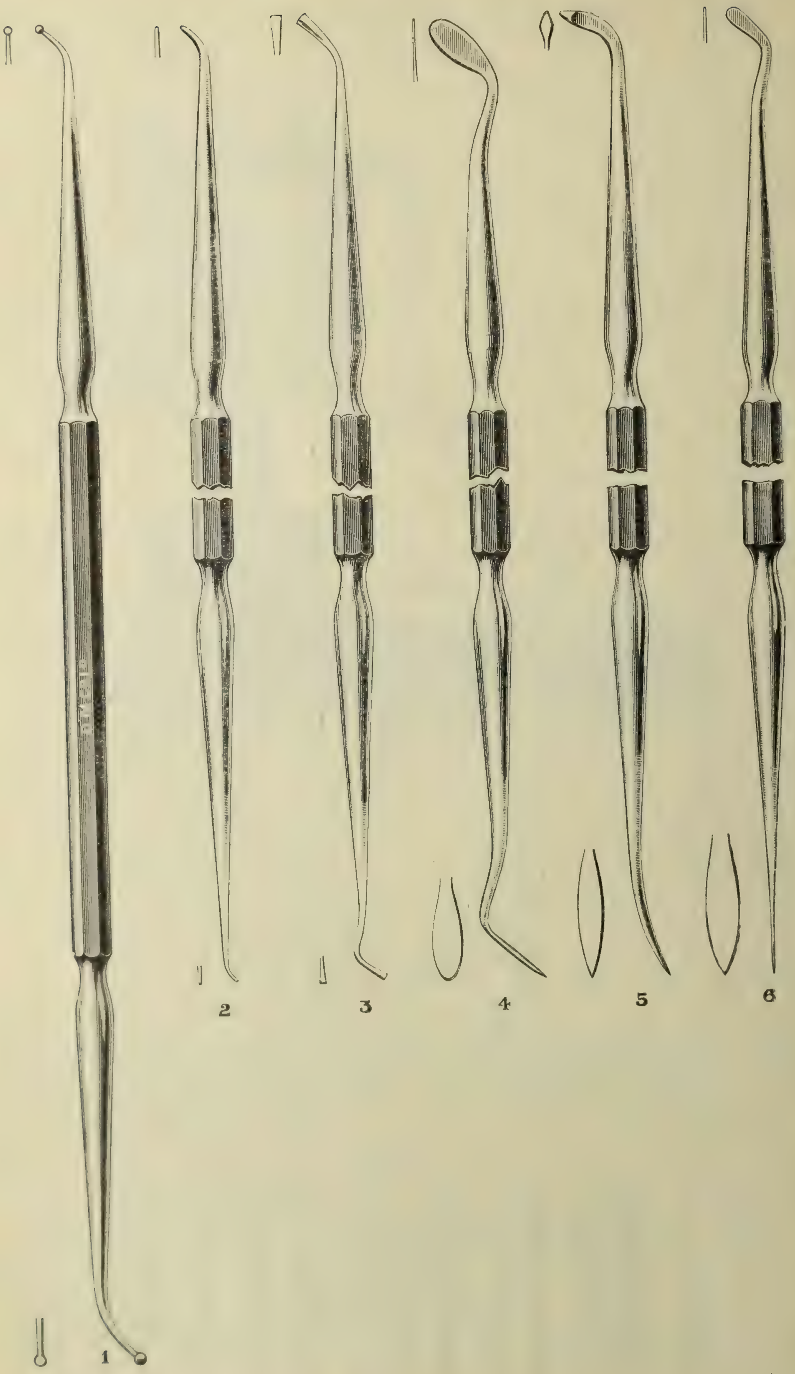


are the diamond-dust points made from my suggestions by Messrs. Ash & Sons, and shown in Fig. 3.

The cavity being properly prepared, the next and most difficult step is that of adapting the platinum or gold form to it. On this point I have some suggestions to offer which will be found to materially lessen the difficulties of this part of the operation, and to make success practically certain in every instance. As to whether we shall use platinum or gold for the inlay form depends entirely upon the grade of porcelain used. The Jenkins porcelains and the low-fusing porcelains supplied by Messrs. Ash & Sons fuse in pure gold forms without difficulty. For the higher fusing porcelains platinum may be used. Rolled gold No. 30, or even 20, is thick enough for the method I am about to describe. The thinner the gold or platinum can be used, the more perfect the fit of the finished inlay. A proper set of instruments for shaping the gold or platinum form and for manipulating the porcelain paste is an important matter. I have devised for these purposes the set of instruments made for me by the Dental Manufacturing Company of London, and shown in Fig. 4.

They are all double-end instruments. Nos. 1, 2, 3, and 4 are designed for fitting the gold or platinum form to the cavity, while Nos. 5 and 6 are for manipulating the porcelain paste. The gold or platinum should be cut out to roughly represent the shape of the orifice of the cavity, but considerably larger. Fig. 5 shows the proper shape for such a cavity as is shown in Fig. 2 at *a*. It will greatly facilitate the shaping of the gold form if a notch be cut out of the gold as shown in Fig. 5, and at the same time decrease the chances of breaking through the gold in forcing it into the shape of the cavity. It should first be introduced into the cavity without annealing. The cut edges will then slide over each other as the center of the gold is forced to the bottom of the cavity. Another excellent plan to be followed without cutting the gold is to place the sheet, after cutting to proper size, on a large, fine-grained cork, and then with the largest burnisher, shown in No. 1, Fig. 4, press the center of the gold sheet into the cork. It will be found that the approximate shape of the cavity can in this way be made in a few moments without bursting through the thin gold at any point. The gold form may now be introduced into the cavity and the fitting completed, and this can easily be done in a great majority of cases without anywhere cutting or bursting through the gold. The fine fitting is best accomplished by packing very solidly with a hard-rolled ball of cotton-wool or spunk. The gold form should be taken out at least once during this stage and carefully annealed, and again packed with wool or spunk. For this part of the operation the instruments shown in Nos. 1 and 3, Fig. 4, are best adapted. Then, with the cotton or spunk tightly packed in the cavity, take instrument No. 2 and most carefully burnish the gold around the entire edge of the cavity. This instrument will be found well adapted to reach every part of the margin. It will generally be found best to hold the cotton-wool back a little from the margin of the cavity when one is burnishing, with an instrument held in the left hand,

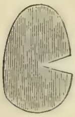
FIG. 4.



and with this instrument (preferably a ball burnisher) also press the cotton-wool well into the cavity. This holds the gold form well in place and prevents rocking while the edges are being burnished.

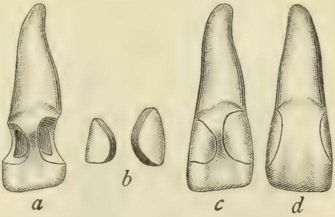
Most operators who have tried inlay work have found the removal and imbedding of the gold form to require the most delicate manipulation, and by the methods heretofore described one is never quite certain whether or not this part of the operation has been successfully performed until the inlay has been completed and tried in place. All of this uncertainty can be entirely done away with by the following procedure: Slightly warm and roll up in the fingers a small ball or pledget of hard, white wax, such as The S. S. White Dental Manufacturing Company supply for crown- and bridge-work. The ball of wax should be just a little larger than is necessary to completely fill the cavity; that is to say, it should *slightly* project over the margin of the cavity all round. The wax should be quite stiff when introduced into the gold form as it lies in the cavity of the tooth. Now take the broad, thin burnisher, shown in No. 4, Fig. 4, and press the ball of wax firmly to place. To prevent the burnisher from sticking to the wax it should first be dipped in French chalk or pulverized soapstone. In such cavities as are shown in Fig. 6, at *a*, a broad polishing tape, dusted with French chalk, may be used for pressing the wax ball into place, but great care should be exercised not to pull the tape the least in one direction or the other, as one would do in polishing a filling. This would rock the gold form and spoil the fit. The pull should be steadily and equally from both ends of the tape, the object being to press the wax everywhere firmly over the edges of the cavity. A stream of cold water should now be thrown on the wax, and then the wax and gold form quickly removed. If this part of the operation is done with ordinary care, the finished inlay will always be found to fit perfectly. To facilitate the quick removal of the form care should be taken to prevent the wax from much overlapping the gold at any point outside the margin of the cavity. To prevent this and also to assist in securing proper imbedding of the gold matrix, it is well to let the margin of the gold project as much as possible beyond the edges of the cavity.

FIG. 5.



Sheet of gold or platinum, notched and ready for adaptation to cavity.

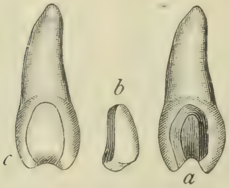
FIG. 6.



Right superior central showing two large approximal cavities to which access is obtained by cutting freely from the lingual walls. *a*, tooth with cavities prepared; *b*, porcelain inlays for same; *c*, tooth showing lingual surface, and *d*, labial surface after cementing of inlays.

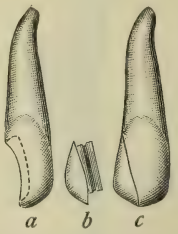
The matrix may now be imbedded without the slightest fear that its shape will be changed. For imbedding material I use plaster and marble-dust. When the investment is sufficiently hard the wax is thoroughly melted out with a stream of boiling water. The investment is then dried and brought up to a full red heat with the blow-pipe. It is then allowed to cool, and is ready for packing. Now, the first step in the packing of the porcelain paste is the all-important one to prevent the porcelain from shrinking away from the walls of the matrix. This may always be accomplished easily with porcelain of any make if the following instructions are carefully observed: Mix the porcelain paste to the consistence of soft putty, and with the upper point shown in No. 6, Fig. 4, *place a ring of this putty around the entire circumference of the cavity, leaving the center quite free or empty.* In melting a porcelain paste it naturally shrinks toward the largest mass of its own body, or toward the center of the mass. If, then, this center be removed we should naturally expect the mass to shrink *toward the circumference,* and this is precisely what happens when manipulated as directed. The matrix always comes out from the first baking with the porcelain everywhere firmly melted to the walls of the matrix. Nor will it ever start from this position at any subsequent baking unless it is very much overheated.

FIG. 7.



Showing bicuspid with cavity involving approximal and grinding surfaces. *a*, tooth with cavity prepared; *b*, porcelain inlay; *c*, inlay cemented in place.

FIG. 8.



Cuspid tooth showing at *a*, large cavity, and at *b* and *c* large porcelain inlay restoring contour of tooth.

After each packing of the porcelain paste, a small camel's-hair brush with a fine point should be moistened (this is best done by drawing it between the lips after the manner of water-color artists) and drawn around the margin of the matrix to remove all overhanging particles of the paste. If this be not done the margins of the inlay will often be found ragged, and a perfect margin is the most essential feature of a porcelain inlay. If gum-water is used for mixing the paste it will be found necessary to remove these overhanging particles with great care, as the tendency naturally is for the gum-water to cause the particles of powdered porcelain to stick to the gold or platinum margin of the matrix. In building up the inlay for restoring lost corners of teeth and for general contours the work will be much facilitated if, after the first baking has been carried through as above described to secure perfect union with the walls of the matrix, a small piece of solid porcelain be placed at the point representing the highest point of the contour of the inlay.

These pieces of porcelain may be made by crushing old porcelain teeth in an iron mortar. Care should be taken to have the piece used small enough so that the outer edge will not show through when the inlay is completed. Corners like the one shown in Fig. 8 may be produced in this manner without much difficulty.

The inlay being baked for the last time, I prefer to let it cool slowly in the electric furnace. All previous bakings may be removed and cooled quickly. When cool enough to handle in the fingers the finished inlay may be removed from the investing material, and the gold or platinum matrix carefully removed. To prevent injury to the edges of the inlay it is best to pull the extending margin of gold or platinum away from the edge all around with tweezers. Once the metal is free from the margin it may be scratched off with a fine, sharp excavator, or removed in any way most convenient. The walls of the inlay should then have fine grooves cut in them. It is best not to cut a groove all around the inlay, for this would tend to weaken it; but rather to cut small grooves or notches at several places. I even prefer not to have these notches opposite to each other. For cutting these notches I have had made by Messrs. Ash & Sons very small diamond-dust wheels, somewhat thicker where they join the shaft than those shown in the illustration accompanying this paper, beveled to a knife-edge. With these tools a small notch can be quickly and easily cut in the smallest inlays. The wheels should always be kept thoroughly wet while cutting.

It is obvious that the cementing of the inlay is an extremely important matter. So far as my own experience in the use of cements goes there are two which are much superior to any others I have used, and I have tried many kinds. The two to which I refer are the Dirigo cement, which Messrs. Ash & Sons have prepared for me for several years, and the Harvard cement. Both of these have the qualities or properties of great adhesiveness, great strength, and moderate slowness in setting. I prefer the Dirigo because I consider it the equal of the Harvard in all respects, and superior to it in containing a germicide which tends to prevent that alkaline putrefactive fermentation which destroys so many cements at the cervical walls of fillings. Some have objected that a germicide can only be efficient while it is being decomposed, but those making such statements have shown themselves ignorant of the facts. Many substances by their mere presence prevent the action of bacteria.

The cement should be mixed somewhat thinner than when used for making fillings. It is always best in trying a new cement to make a number of experimental "mixes," allowing them to harden, and observing the time required for hardening and the hardness of the cement when this process is completed. The cement should be thoroughly smeared over the walls of the cavity and over the inlay. Force the inlay to place with wood points or wedges. I have a variety of these wood points and wedges always at hand to suit all cases. The pressure on the inlay should be maintained for four or five minutes. When the inlay is first forced to place I rapidly scrape away the excess of cement squeezed out, to see that the inlay is in exactly the proper position, then renew the pressure and hold it steadily without the slightest movement.

A Few General Considerations.

I have made a number of experiments for the purpose of ascertaining the firmness with which inlays are held in place by the cements I have recommended. In every instance the cavities were made cup-shaped or with very flaring walls, and in some instances this flare was so great as to make the cavities almost saucer-shape, as shown in Fig. 6. In no one of these experimental cases did I cut grooves on the inlay. The glazed surface was removed by passing a corundum wheel over it, and without further treatment the inlay was cemented in place. The specimen was then left for forty-eight hours. At the end of this time a groove was cut with a fissure bur under one side of the inlay, and the attempt was made to lift it out with a steel wedge. In no instance have I succeeded in removing an inlay without breaking it into several pieces.

It would, of course, not be wise for any one to attempt these extreme cases in the mouth until we have had a longer experience in the use of inlays, but I have great confidence in their durability when a reliable cement is used. It is quite possible that we shall be able to discover a better cement for porcelain inlays than the best oxyphosphates. I have been experimenting a little with hard Canada balsam, and Dr. Perry, of New York, tells me that he has been experimenting with a special porcelain cement. But I think nothing sufficiently positive and satisfactory has yet resulted from these experiments to be reported upon. In inserting inlays in very white teeth I have found that no porcelain yet offered for sale would give me a sufficiently light color. Mentioning this fact to Messrs. Ash & Sons, they called my attention to a dead white porcelain which they introduced for imitating on artificial teeth those white spots often seen on natural teeth. I find that a very little of this mixed with the light-colored porcelains will give me the shade desired for the whitest teeth. I also mix a little of this same white porcelain powder with my oxyphosphate cement when I wish to get a whiter tint than is found in the cement.

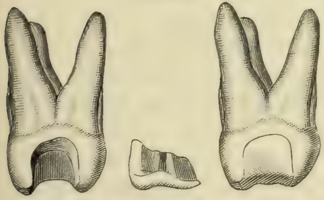
I have found that in most cases a better joint of the inlay to the tooth may be secured by placing an extra thickness of gold or platinum in the bottom of the matrix. This should completely cover the bottom of the cavity and project slightly up the sides, but should nowhere be allowed to reach the margin of the cavity. This seems to permit forcing the inlay more completely to place.

I consider the range of porcelain inlay work in the restoration of teeth as practically unlimited. Figs. 9, 10, and 11 represent some of the most extensive practical cases I have attempted. Here in England, where we meet with many cases of chemical erosion accompanied by extensive absorption of the gums, especially above the incisors, cuspids, and bicuspids, the method of restoration shown in Fig. 10 is extremely satisfactory. The tooth is restored to its normal line in a porcelain which matches it in color, and above this is placed a gum-colored porcelain to supply the loss of the natural gum. These cases are proceeded with in the usual way up to the second firing. Then the gum porcelain is put on, and also whatever may be necessary to complete the lower part of the inlay. Four bakings are generally necessary for these cases.

Extensive restorations of molars and bicuspids involving grinding-surfaces and approximal walls are perfectly feasible, and not especially difficult when hard wax is used in the manner I have described. I have tried only one case of restoration of the tip of a tooth as extensive as that shown in Fig. 11. My judgment is that in most cases of this sort it would be better to put on an entire crown, but one occasionally has patients who will pay for almost any amount of time and trouble rather than have even the half of a tooth cut away.

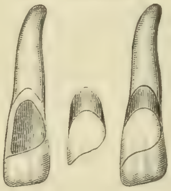
In a great majority of approximal cavities in the incisor and cuspid teeth I cut away the frail lingual wall thoroughly and work entirely from behind the teeth, as shown in *a*, Fig. 6. But in all such cases it is better to allow the inlay to come just over the front curve of the tooth, as shown in *d*. The light is then reflected from the inlay in such a manner that it is less noticeable than it is when the inlay is not brought so much to the front. Approximal inlays should always be made a little lighter in color than the tooth in order to get the most satisfactory effect.

FIG. 9.



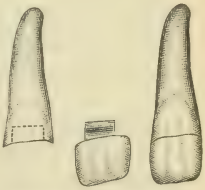
Showing large cavity in molar tooth involving approximal and grinding surfaces. Restored by porcelain inlay.

FIG. 10.



Showing large cavity formed by chemical erosion and accompanied by shrinkage or absorption of the gum. The contour of the tooth is restored in porcelain which matches the tooth in color, while the gum is restored in gum-colored porcelain. The inlay is baked and inserted as one piece.

FIG. 11.



Showing restoration of broken lateral incisor by porcelain tip.

My continued experience confirms me in the opinion I expressed in a letter published in the DENTAL COSMOS several months ago,—viz, that porcelain work has come to stay. It is the first really artistic method ever devised for restoring decayed teeth, and, according to my experience, one to which patients give a quick and cordial recognition. Its introduction will tend toward increased skill on the part of the dentist and increased appreciation of dentistry on the part of the public.

(To be continued.)

MANUAL AND ARTISTIC TRAINING IN OUR PRELIMINARY EDUCATION.

BY R. H. HOFHEINZ, D.D.S.,

PROFESSOR OF OPERATIVE DENTISTRY, UNIVERSITY OF BUFFALO, DENTAL DEPARTMENT.

(Read before the National Dental Association, August 2, 1899.)

MR. PRESIDENT and Gentlemen: The subject of education seems almost exhausted. There is hardly a meeting of a scientific body where one or more papers are not devoted to it. In view of this fact, it may seem presumptuous to come before you with another presentation of the subject. My excuse is that my views are somewhat different from those expressed by others, and for that reason I risk the charge of discussing a trite subject.

Before pointing out what education should be, I ought to point out briefly what it has been. In the great work of Quintilian, which is the first complete sketch of theoretical education, the importance of studying individual disposition is strongly urged. We have here the first attempt to specialize education.

The education of the Middle Ages was either that of the cloister or that of the castle; they stood in sharp contrast to each other. The object of the one was to form the young monk; of the other, the young knight.

About 1500 Erasmus broke away from this conception of education. Before his time Latin had virtually become a dead language, but he insisted that it should be taught so as to be of use,—a living language adapted to modern wants; he also took account of individual peculiarities.

Sturm, the great teacher at Strassburg, whose students numbered thousands, comprising all nationalities, taught principally pure, elegant Ciceronian Latinity as the best equipment for the gentlemen of that century.

In 1600 Comenius conceived that if teachers would follow nature, instead of forcing it against its bent, education would be much improved.

The earliest teachers recognized the fact that nature must be consulted in all matters of education. The doctrine of evolution has illuminated every problem of human thought and action, though in many cases we have failed to grasp and accept the consequences of its teachings in all their important applications. But in no direction has it thrown greater light than in the direction of education. It has called attention to the importance not only of natural aptitudes, which the ancients and medievalists appreciated to some extent, but of specialization, which they knew little or nothing about. Thus I am brought face to face with the particular question that I wish to discuss,—namely, are we specializing our early preliminary education as we ought, as the doctrine of evolution requires?

We know that the dentist was evolved from the blacksmith, barber, and watchmaker in European countries, but with social and scientific progress it was inevitable that he should become differentiated and stand by himself. Excellence was obtainable in no other way.

Dentistry developed into a science of its own, and ranks to-day as a specialty of medicine. The assertion has been made that the time is not far distant when every dentist will be a physician. It has even been said that every physician should be a dentist. The latter statement I cannot accept at all, the former only with qualifications. Dentistry without medical science to-day is an impossibility. All sciences are more or less descriptive, because further development may change them at any time; and a one-sided scientific education is apt to become as harmful to a profession that is largely based upon technical and artistic execution as a one-sided technical training would be. This has been thoroughly recognized by all dental schools. The question arises, Has it been recognized in the preliminary education of the dental student? Are the three years of dental education sufficient to thoroughly train unskilled hands which have had no previous chance for development, the mind having been properly trained in the preliminary schools for the reception of the higher branches of education?

All preliminary education is bestowed upon the mind, while all the executive functions of the physical system are ignored. The development of these executive functions is as necessary as a knowledge of the sciences tributary to dentistry.

Philosophy teaches that mental perceptions depend upon the senses, and that the faculty of comprehending objective phenomena is in the mind. Without the senses no object can enter the mind; no object can be understood by the senses. Only through the united operation of both can knowledge arise.

We have been convinced, and are acting accordingly, that the mind requires an amount of preliminary training formerly not dreamed of for the dentist. We bestow, however, but three times seven months upon the development of manual dexterity, not quite sufficient to atone for the neglect and omission of all such teaching during the entire time of preliminary instruction. It is here where we need a special preliminary education for the future dentist. I make the broad statement that a student who under favorable conditions has not developed some manual skill at the age of eighteen—the time for college entrance—does not possess the physical requisites of a good dental operator.

In my estimation, we should be in position to judge the physical the same as the mental equipment of the dental student previous to college entrance. The student who is not naturally endowed with a reasonable amount of manual ability will never become the dental operator so much needed. He is in the unfortunate position of Walter Scott's hero in Waverley, who says that "he was losing forever the opportunity of acquiring habits of firm and assiduous application, of gaining the art of controlling, directing, and concentrating the powers of his mind for earnest investigation,—an art far more essential than even that intimate acquaintance with classical learning which is the primary object of study." So great a philosopher as Emerson has recognized the need of a manual education. He says, "We must have a basis for our higher accomplishments, our delicate entertainments of poetry and philosophy, in the work of our hands. We must have antagonism in the tough world for all the variety of our spiritual faculties, or they will not be born." Manual dexterity is but the evidence of a certain kind of mental power, and it should go hand in hand in its early development with that of the mind.

The education of our students in this direction, preliminary to their admission to college, would necessitate the introduction of drawing and constructive work into all secondary schools. In England the so-called modern side has been added to the traditional course. In France the Lycée has its *cours spêcial,* in which mathematics and the sciences replace Latin and Greek. In Germany the well-established Real Gymnasium and Real Schule are justifying more and more their right to exist on an equal plane with the Gymnasium itself. An especially interesting movement in Germany is one which endeavors to establish an "Einheitsschule," a combination or unification school, in which the main features both of the Gymnasium and the Real Schule are to be united.

N. M. Butler, Professor of Philosophy and Education in Columbia College, in a paper on the "Function of the Secondary School," says, "The course of study that I would suggest for the typical American secondary school is one in which these elements are always represented,—namely, the mother tongue, geography and history, natural science, mathematics, Latin, Greek, French and German, drawing and constructive work (manual training), and physical training. This would not be unlike what German students of education have in mind under the name of Einheitsschule.

"Pupils of a different temperament, of different points of view, and with different purposes in life, would be guided to express and to satisfy themselves to the fullest extent possible.

"To introduce this subject generally into the secondary schools of this country would be a new departure, but only because its schools have not been doing their duty by the pupils intrusted to them. Taken together, drawing and constructive work constitute what is properly called manual training, the educational value of which has been established beyond all contravention both by argument and experiment. It aims to develop in the pupil powers of thought-expression that no other study reaches, as well as to train the judgment, to call out the executive powers, and to give self-confidence in dealing with actual material. In many secondary schools the pupils may wish to follow manual training beyond the mere rudiments, and with more special reference to its scientific and technological applications."

To whom does this apply more than to the future student of dentistry?

The scientific dentist is not scientific if he has not mastered thoroughly all the requirements of his profession, numerous scientific teachings requiring clinical skill, observation, and reflection to verify them. The special preliminary education which I here advocate must begin early in life. The secondary—yes, the primary—schools are the proper place for the development of that faculty which is most neglected. The great Froebel implanted constructive work in his immortal kindergarten system, and the proper continuation of it in the primary and secondary schools would allow an expansion of the manual faculty or would disclose a deficiency, and therefore an unfitness for the dental profession.

How many dentists have been complete failures owing to a total lack of constructive ability? How many beautiful things have been written and told, but never done, by some of our writers? Professor Tyndall says, "Half of our book writers describe experiments that they never made, and their descriptions often lack both force and truth. No matter how clever and conscientious they may be, their written words cannot supply the place of actual observation and of actual manipulation." There is a vast portion of human knowledge belonging to special pursuits, and whoever engages in any of them requires a training in the special science or art relating to them. We teach our young men to recite Greek verses. (Let me say here that Greek is one of the accomplishments the German University does not require of a student of medicine or dentistry any longer,—quite a step forward in the specializing of preliminary education.) The youths of Athens, however, were not required to study two dead languages for the best period of their school days; they were made the recipients of a practical scholarship. In 1844 our Emerson said, "We are students of words; we are shut up in schools and colleges and recitation rooms for ten or fifteen years, and come out at last with a bag of wind, a memory of words, and do not know a thing. We cannot use our hands, our legs, our eyes, or our arms." This may have been severe even in 1844. We have learned since to use our legs and arms, but not our hands and eyes. If we had learned to use our eyes we would not be so sadly lacking in one other element of our education, an element which must also be instilled early in life, and without which we are drifting into a rudeness of operative and technical skill very conspicuous and much to be lamented,—namely, artistic taste.

Numerous protests have recently been made in dental meetings and journals against the indiscriminate use of gold crowns on the six anterior teeth. What does this signify? It signifies that the dental operator and the patient are lacking the proper esthetic training; it signifies that we have not learned the proper use of our eyes. The esthetic inheritance, that feeling for the beautiful and sublime in nature and art which was so well understood by the Greeks, is largely lacking in us, and unless we are to degenerate in our skill we must see that that esthetic inheritance is placed side by side with the scientific in the education of the dentist.

The absurd remark has been made that the dental colleges and their teachers are to blame for this deficiency. They are not to blame for a degeneracy, for a lack of early training. Our age is possibly too pre-eminently scientific. A French critic of the last exposition in France said, "Our own time is being characterized by the infusion of scientific theories, by the logical necessities of imitating everywhere nature's observed processes and methods. A strong realistic tendency prevails not only in literature and art, but everywhere. It means spiritual servitude. It means fatalism."

Some of this fatalism is showing itself in our profession. The realistic tendency of the mind of the dentist lacking incentive, the realistic tendency of the uncultured multitude, is to blame for the hideous work of some of our dental operators.

Public education in art is needed. Individuals here and there have always had art training, but it is too generally assumed that art education belongs only to the few. Goethe says, "Men are so inclined to content themselves with what is common,—the spirit and the senses so easily grow dead to the impressions of the beautiful and perfect, that every one should study to nourish in his mind the faculty of feeling the best things by every method in his power. It is only because they are not used to taste of what is excellent that so many people take delight in silly and insipid things, provided they be new."

It would be a sad fact if scientific education would have to mean a stifling in children of that spirit which alone can make facts vital and inspiring. The art spirit should enter into every-day labor. The public, or at least all primary, schools should take account of the higher nature of the child,—the esthetic faculty, which belongs to this higher nature. Art and science should never become separated; they belong together; they should walk hand in hand as sisters. All the instruments of precision that have contributed so much to human knowledge had their origin in the workshop; art cultivation refines the sensibilities and has an elevating effect on all minds.

The question may justly be asked here, To what extent would manual and artistic preliminary training interfere with the required academic teaching? The only competent answers we can get are from teachers of grammar and high schools where manual training is optional. In the report of the Commissioner of Labor on Industrial Education, 1893, he tells us that Dr. Belfield made inquiries regarding the influence of manual training on book-work, and presented the results in tabular form. I quote but a few, and only of schools where the constructive work is optional.

H. W. Campton, superintendent of the High School, Toledo, Ohio, says, "I think the effect of manual training on the minds and characters of pupils is healthful and wholesome; those who take manual work do just the same amount of work in text-books as those who take no manual work. So far as I can judge from general observation of the characters and the mental work of the pupils, I see but little difference in the two classes of pupils."

R. D. Crawford, superintendent of the public schools, Tidioute, Pa., says, "They do as much work and fully as well."

A. H. Fetterolf, president of Girard College, Philadelphia, Pa., says, "Our experience is that boys do better in academic work with practice in manual training; they show more intelligence in comprehending whatever is brought to their notice, while in general they have a wider range of thought."

Addison Jones, superintendent of public schools, West Chester, Pa., says, "The boys do as much book-work, and I believe do it better than the girls, who do not take manual training."

A. J. Steele, principal of Le Moyne Institute, Memphis, Tenn., says, "In mathematics and science, direct and undoubted help. In literature and generally, can see no injury. The tendency is to train or lead to natural methods of study; cramming or mere memorizing is dropped for real study."

B. R. Dudgeon, superintendent of public schools, Menomonie, Wis., says, "The academic work did not suffer in the least. In many cases, especially among the slower pupils, the academic work seemed to improve. I did notice that the pupils who were noticeably careless in their work in academic lines became ambitious to do work which compared favorably with that of other pupils, and it seemed to me that these pupils were somewhat inspired by a self-respect and pride which reached beyond the school."

This does away with the objection that the ordinary observer might make,—namely, the sacrifice of the academic work for that of constructive work.

I hope that I have not been misunderstood. I do not expect to set up a curriculum of technical and esthetic training to take the place of the classical and scientific. Far from it. It has been my aim to show to the regents and examining boards that it is not the question of quantity of points which are necessary for the proper preliminary education, but pre-eminently quality of points.

As Helmholtz has remarked, "We see scholars and scientific men absorbed in specialties of such vast extent that the most universal genius cannot hope to master more than a small section of our present range of knowledge." The almost infinite range of human knowledge compels each student to select a course of study narrow and narrower all the time. The preliminary education must adjust itself to the needs of the future more and more, and nowhere is this more necessary than with the future dentist. His early training must have a more specific direction, not at the expense of science, but for its benefit.

Professor Fiske, in his "Destiny of Man," says, "All human science is but the increment of the power of the eye, and all human art is the increment of the power of the hand. Vision and manipulation—these in their endless and transfigured forms are the two co-operating factors in all intellectual progress."

Hand in hand with the training of the mind must be that of the hand and eyes, if we are not destined to that fatalism in operative dentistry that is beginning to make itself so brutally felt. The intellectual stimulus of constructive art is more vigorous than that of literature; we are continually stimulated by the presence of the object and the operations to be performed. The perceptions become clearer, more positive, more precise. It is a great mental discipline; yes, I go so far as to say it is a great moral discipline. It leads to more exact action; it leads to greater honesty, for honesty is but the moral expression of exactness.

THE DENTIST'S POSTURE.

BY L. D. SHEPARD, D.M.D., D.D.S., BOSTON, MASS.

(Read before the Dental Society of the State of New York, May 10, 1899.)

A RECENT address by a distinguished investigator has furnished an illustration of the keen disappointment which an earnest worker may feel at the indifference of the profession to labors for progress, and his surprise and disgust at the inertia of the great majority in contentedly accepting present errors, rather than to look into and adopt the advanced theories so laboriously worked out by himself and a few others.

He fails to recognize that in all grades of society and in all vocations the great mass are lethargic in respect to advances and improvements, being satisfied by fairly comfortable present conditions. He fails to appreciate the lesson of historical and contemporaneous experience, that the leader in progress must be satisfied and rewarded by the consciousness of work well intentioned and well performed. Fortunate indeed is he if he escape ungenerous criticism of his work or his motives; fortunate also is he if he can be like one of that genus defined as a pachydermatous mammal. But if he is a philosopher and brave professional patriot he will rise above these disappointments, and, conscious of good intentions and the truth of his cause, he will renew his bombardment of the fortifications of error.

While I say this is true of the mass of the profession, I am happy to express my conviction that I have seen great progress in my day, and have implicit faith in its continuance. The professional societies have done and are doing a great work, and the colleges and their devoted teachers are fast making ours a learned profession under the stimulus of higher educational requirements in all professions, and particularly of the college's best friend and ally, the modern dental law.

The able and distinguished friend to whom I have referred has been a worker in the higher and more abstruse realms of investigation. I doubt if it will be any consolation to him for one who admits that he has delved in a lower stratum to send to him, across the water, his conviction, as a result of long experience, that a similar indifference has obtained and does obtain among the mass of the profession in regard to suggestions of progress in purely practical details as in his theoretical studies.

There are probably few men who have been active in our societies, colleges, and literature, and who have invented or promulgated improved methods of operating, but have been disappointed at the indifference with which their offerings have been received. A few of the improvements have "caught on" for one reason and another, but the most of them fell upon stony ground, and are to be found embalmed in the covers of magazines and transactions.

To-day I propose to resurrect one of these forgotten mummies, remove it from its sepulchre,—the Transactions of the American Dental Association of 1872,—brush off the accumulated dust of twenty-seven years, and present it to you, a new generation of dentists, very few of whom ever knew that any such paper was ever written.

Very probably it is not worthy of revival, and better have lain undisturbed in its grave; but when I received the invitation of your president to address you on this occasion I bethought me of my last darling,—for each one loves his own,—and judged at least that I could save present labor by cribbing from the past.

On page 112 of the published Transactions of 1872 you will find this paper, entitled "Use and Value of Mouth-Mirrors, and Position in Operating," from which I will take the following extracts:

> "The student of dental literature will find but little in the text-books and periodicals upon the subject of mouth-mirrors. They are referred to casually as of advantage, but have not been given that important place on our cabinets that in my opinion they deserve.
>
> "In the examination of the mouth for the detection of disease, and to determine what progress has been made in the preparation of the cavity, its final shape, and an occasional use during the following processes, till the last examination, when the operation is pronounced complete, is about all that has generally been claimed for the mirror. In a word, it has generally been regarded as of great value as an adjunct to our case of instruments, for occasional use (but not, as I regard it, a necessity for constant use), or in other words, as an assistant to the eye in determining what has been done rather than as a constant assistant in the doing.
>
> "In discussing the use and value of mouth-mirrors, as in the discussion of all the operative departments of our practice, in distinction from the theoretical, it becomes necessary to adopt the first person if we would be explicit and readily understood, hence I shall be under the necessity of frequently speaking of how I use it in my daily practice. In thus speaking, I shall not claim any special distinction,—only that I have mastered the use of this instrument, and hope that my words will encourage those who have not, to do so as soon as possible.
>
> "For some years I have been advocating a larger use of the mirror, and have observed carefully the practice of others,—excellent operators too,—and as a result of my observations and inquiries am convinced that the large proportion of practitioners are sadly at fault in this particular, and as a consequence do poorer work, with less facility and greater fatigue to themselves and patients, than would be the case were they to use the mirror more, and become, what any man can, master of it.
>
> "The past few years have witnessed a great improvement in mirrors for our use, as in everything else in our specialty. The old ones were clumsy enough, and some of them expensive, of poor glass, and poorer frames, and totally unfit for comfortable use. . . .
>
> "In considering the use of the mirror, I claim that a thorough master of it knows no difference whether he is looking directly at the tooth while at work upon it, or looking at its reflection in the mirror. By 'no difference' I mean that he does not make any false motions. It is not necessary to remark that with the mirror, all motions are made reversed. A point can be reached where no special thought is required in regard to the direction of the motion, but the motion is made, as it were, automatically. No man gives special thought to the direction of his movements when tying his cravat or parting his hair. Such processes have been performed so many times that he does them automatically. In other words, he is complete master of the mirror in toilet operations. A further illustration is found in becoming accustomed to the use of the duplex mirror, or hand mirror, in addition to the stationary one, as in parting the back hair. At first it is awkward, and requires special thought, but soon we master the situation, and have no difficulty. This is what I claim is requisite in one who has acquired full mastery of the mouth-mirror. It is not simply that he is able to work while looking at the object in the mirror, but that he shall know no difference in ease and facility, and never make a false move. It is not only a possible consummation, but of

less difficulty than one imagines who has never perseveringly attempted its acquirement. It cannot be acquired immediately, but by gradual progress,—six months of faithful attempt will do much.

"There are two classes of operations where this facility in using the mirror is of value. The first, where it is indispensable, if we would do good work; and the second, where although not indispensable it is of incalculable advantage to both dentist and patient.

"How men who cannot thus use the mirror manage to fill properly some cavities I do not understand. To illustrate: Cases are not infrequent where cavities, and small ones, situated upon the distal surfaces of molars and bicuspids, not only cannot be seen themselves, but by the peculiar inclination of the teeth it is impossible to see where they are without the glass. I will not imagine how such cases are met, but make the assertion that a man who cannot thus use the mirror cannot fill them thoroughly and in the best manner. It is as impossible as it is to deviate the mallet force from a straight line, or shoot round a corner. . . .

"It is, however, in that large class of operations in which it is customary to get along without the constant use of this instrument, that I would particularly urge a change. There is hardly a limit to the circumstances and conditions in which there is a great gain to both patient and operator in this ability to use the mirror. In probing the mouth or that critical examination which can only be made by drying the spaces between the teeth, and passing various instruments between, the mirror can be used to hold back the corners of the mouth and keep the napkin in place, while we are looking into it to see the direction of the various instruments and ascertain the condition of the teeth. In fact, this use of it as an extension finger is of great advantage in all processes,—it may be a cheek-holder, a tongue-holder, a napkin-holder, according to circumstances. Then in excavating, with the aid of the air syringe, we are able to see, at all times, just what we are doing, and never obliged to operate simply by the sense of feeling. Some may be able to determine fully by this one sense alone, but when we can, is it not better to call in the additional sense of sight? Particularly is this the case when cutting about those portions of the tooth which are nearest the vital center, which are at the same time deepest and most inaccessible to unaided sight. To express it otherwise, we, in effect, put our eyes where the glass is, or can look into the cavity, as if we got bodily into the very mouth itself. This greatly facilitates the operation, as well as insures greater safety and thoroughness. In putting in the filling the same argument applies, with the additional advantage of being certain that there are no spaces left unfilled, which the next piece of gold will cover up, unless we take time to examine with the glass very frequently. With the glass in position much time is saved.

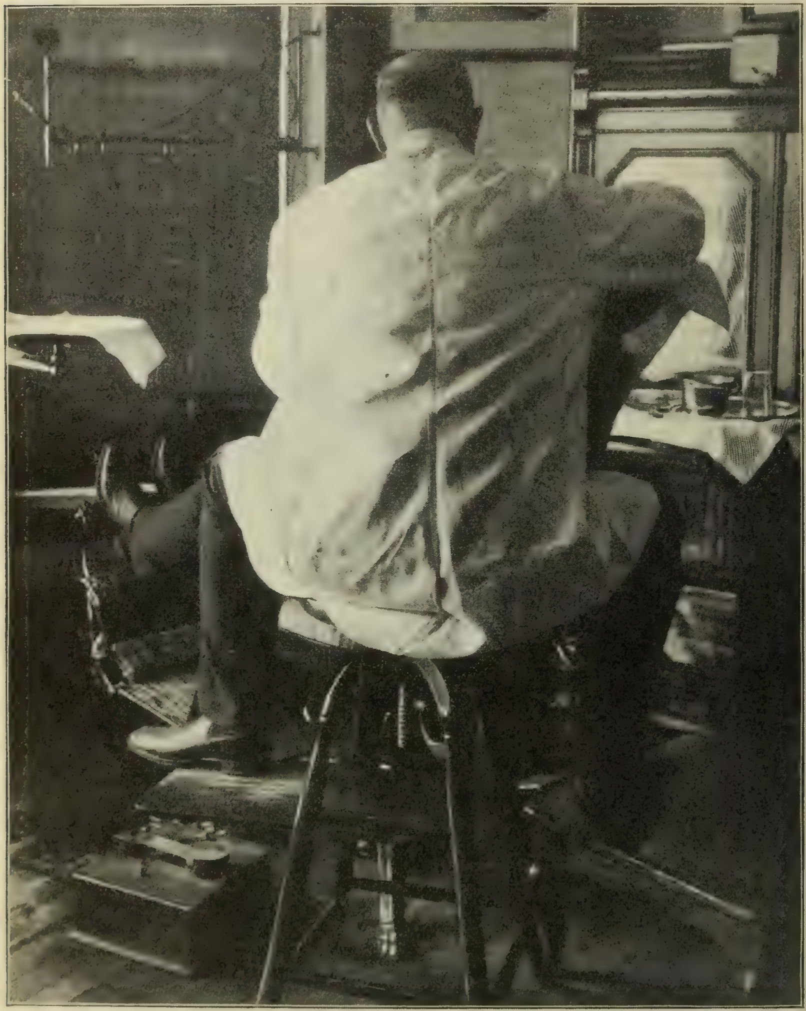
"There is a certain class of cavities where the glass enables us to adopt an improved method of operating. As an example, in approximal cavities in the superior incisors, when the palatal wall is thin we can cut out this thin wall and gain access from behind. Through this opening we can see all parts of the cavity, save all or nearly all separating of the teeth, excavate with greater certainty, fill more thoroughly, and avoid all showing of the gold. This method of gaining access to the cavity, with more or less beveling, after the manner advocated by Dr. Robert Arthur for the prevention of caries, has been practiced by some of our most eminent operators for fifty years. Among the most prominent living exemplars of the advantages of this method is Dr. Edward Maynard, formerly of Washington, who always operated in this way, and worked from underneath, using the mirror. I became convinced of the merits of this method, some years since, by seeing many teeth which had been so filled by Dr. Riggs, of Hartford. He called the separations made by the cutting away of the palato-approximal angles 'self-cleansing spaces.' It may be possible to operate in this manner by tipping the patient's head very far back, but the only proper way is to use the mirror for our guidance. I believe that in certain classes of teeth this method is the best which can be adopted. The great reason why so few have practiced it in the past has been the difficulty of seeing the cavity, which, by the use of the glass, is removed.

"But perhaps the greatest argument for us is the relief which the glass gives from a constrained and health-destroying position of the head and body while operating. The head is erect and above the patient, instead of being bent down so as to look up into the mouth. The patient is also relieved from the severe strain upon the neck from tipping the head back so far, as well as the necessity of so wide an opening of the mouth. It is well known that dentists, as a class, break down early in their practice if kept very busy at the chair. Where there is a miscellaneous practice, which includes extracting and plate work as well as filling, the change from one to the other gives relief and rest; but to the branch which is entirely occupied, hour after hour, in filling teeth, the strain is terrible. Very much of this is the result of standing in such an unnatural position.

"Coupled with this method of practice is another of scarcely less value to the health of the operator, of which I can speak with great assurance from many years' experience. As we look around upon a gathering of dentists of a size like this, perhaps the most noticeable feature is the small percentage of men of age. If this is so with this body, which is to a large extent composed of men of comparatively large experience and long practice in the profession, would it not be likely to be still truer of the mass of practitioners throughout the country? That it is so, no one who has had much experience in meeting the profession can deny. To a certain extent this is the result of the great growth in numbers of the profession within the past ten or fifteen years. But this explanation cannot answer the question, 'The fathers, where are they?' There were men enough in the profession years ago to give us many fathers to-day. But we look almost in vain for them. Why do we miss Varney—the finished and accomplished—and scores of others, older or younger, whose names will occur to you as I read, who are either dead or practically so, as far as further usefulness in the profession goes? The answer is plain. The practice of our profession is exhaustive to both mind and body. The mind, though, seldom fails except as the result of abuse, but the body does from a too great and long-continued drain upon the vital functions. It is of great importance to us to discover methods of operating by which this drain will be lessened without detracting from the thoroughness of our operations. I have secured this result by sitting while operating, and would urge it upon the profession as worthy of a fair trial. Eight years ago I felt myself breaking down from severe labor at the chair, and was obliged to give up practice for a time. I then commenced to sit while operating, and have done so ever since. I know that it has saved me from the necessity of quitting practice, and that I have operated during these years with equal facility and far less fatigue than before. There may be others in the profession who have been in the habit of always sitting while operating, but I have heard many say that they have tried it and given it up. I think the cause of their want of success was because they had not the right style of stool. What is needed is a firm support to the spinal column, and this should be as nearly as possible like what we get when seated in a chair with the feet resting upon the floor at a little distance from the chair. In sitting upon a high stool we do not get this support by resting the feet upon the rounds of the stool, for our point of support is then too near the base. To arrange the proper support take an ordinary four-legged, high, office stool, cut the legs so as to make it the proper height, affix to two opposite rounds, or otherwise, a board extending twelve inches beyond the legs, then place another board of similar length above this, crossing it at a right angle. We now have two foot-rests extending twelve inches from the adjacent sides of the stool. Place this stool so that one foot-rest will be behind the operating chair and the other on the side. When seated upon it, one leg will be behind the chair and the other on the side. We are thus near the chair and firmly braced. We can then exert as great force as when standing, and have the same command of the arms, the spinal column is firmly supported, and we have an entire freedom from that sense of exhaustion and pain about the loins which results from an undue curvature of the spine in the small of the back, from standing a long time with one arm raised and around the patient's head. Those who have not tried this method can have no conception of the relief from pain and fatigue which it brings, and of the hours of extra work which they can safely perform by the aid of this simple contrivance. I should add, however, that my experience with it is in conjunction with the mirror, and that, perhaps, without the mirror its most beneficent effects may not be realized.

"I commend to you a patient and persevering trial of both these adjuncts to health and happiness in practice, with the assurance that were I to be deprived of either of them I should not wish to continue in the practice of dentistry."

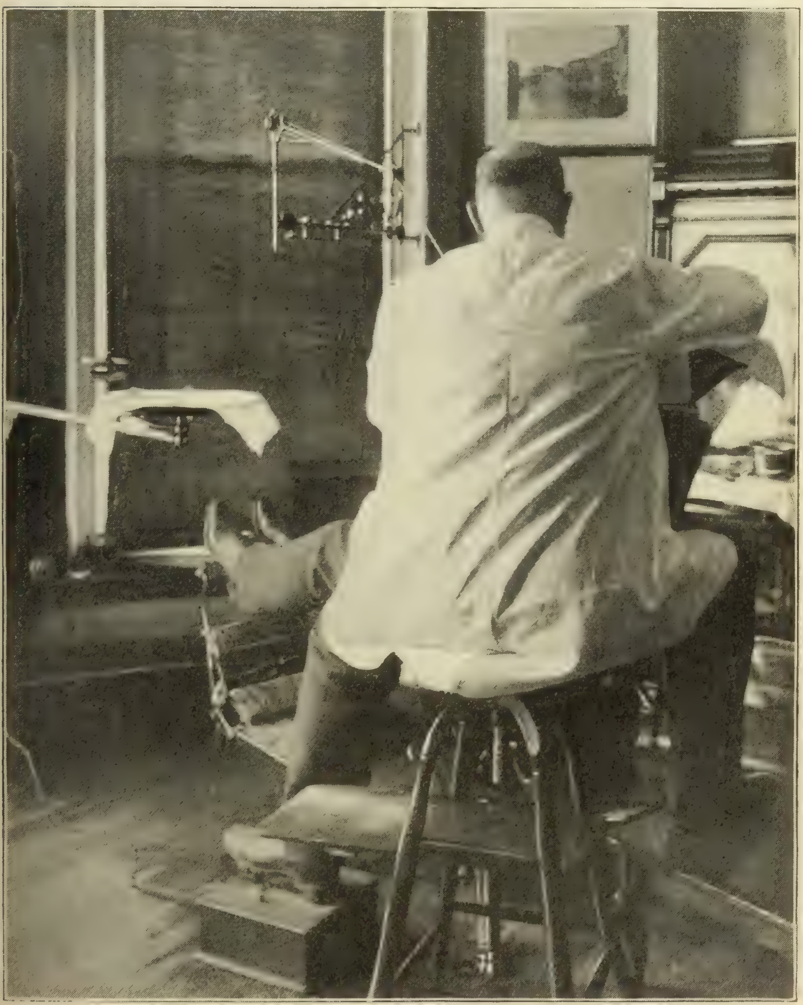
FIG. 1.



Soon after the reading of this paper Dr. S. S. Southworth, of Niagara Falls, invented a stool for dentists, and quoted largely from my paper in his advertising circular. A little later the well-known stool of Dr. Lyon was put on the market. But I have continued to adhere to the old pattern which I first adopted.

Commencing with the organization of the Harvard Dental School, thirty years ago, I continued to teach it for the thirteen years of my professorship; and, the graduates of those years becoming professors and teachers, the method has continued to be taught; while sixty of the graduates having settled in Boston, the practice in my section is fairly common. It has been the observation of the Examining Board of Massachusetts that the graduates of other schools have not shown a similar mastery of this method.

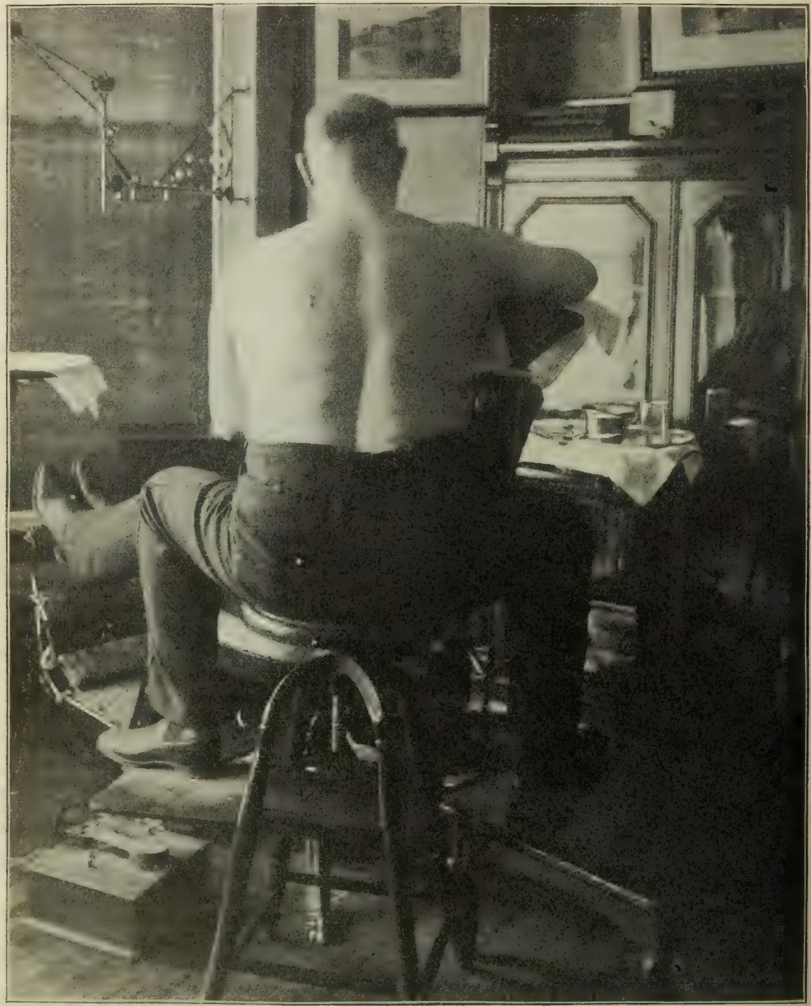
FIG. 2.



I have not taken the time to make a fresh search through the hundreds of my bound volumes, but I have been a fairly thorough reader of the magazines and other literature, and, trusting to my memory, I think I can safely assert that in the papers and discussions of the past twenty-seven years there has been little evidence that the profession has adopted to any extent the methods advocated in the old paper which I have just read.

An examination of the recent text-books leads to the same conclusion.

FIG. 3.

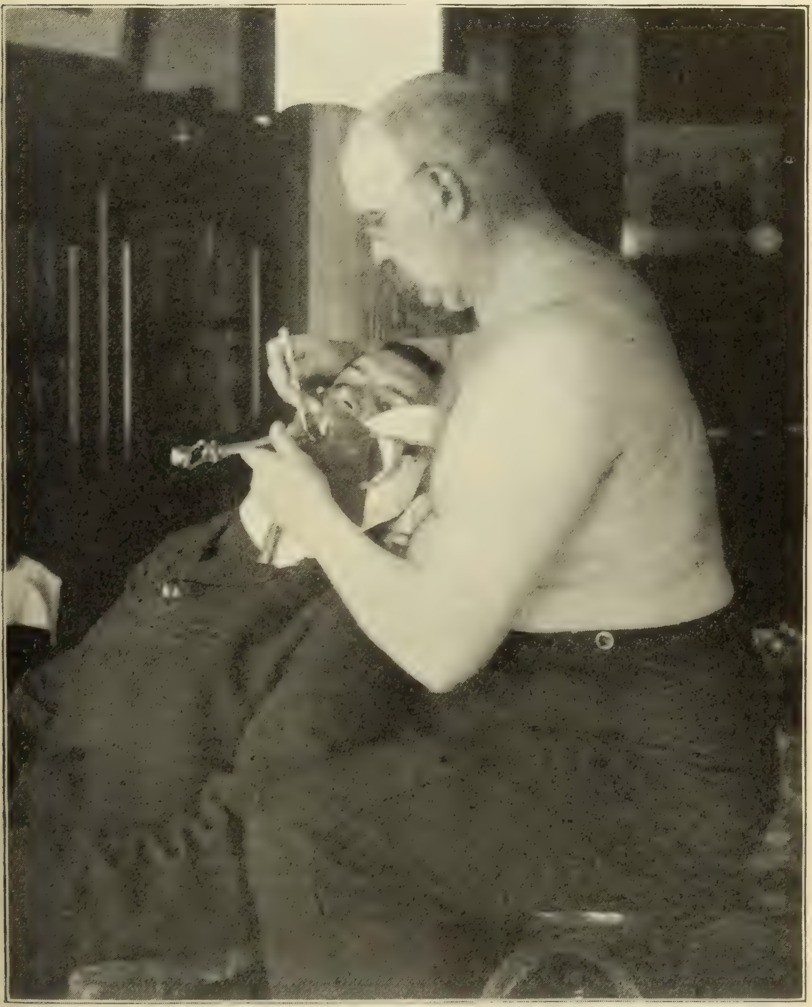


In the second edition (1899) of "Methods of Filling Teeth," by my friend who is to open the discussion on this paper, I find the following allusions to the mouth-mirror:

Page 71. "A third (use of Watts's Crystal Gold) is where a portion of a cavity which is very inaccessible requires the use of the mouth-mirror."

Page 118. "Yet really we do not, for now we are using a mirror, and in the reflection this labial groove, though actually nearer to us, appears to be farthest from us, and in this instance we must fill by appearances. If the operator is not skilled enough to use the mirror he then tips the chair back and lowers his head, so that in that position the labial groove becomes really the farthest point from his vision."

FIG. 4.



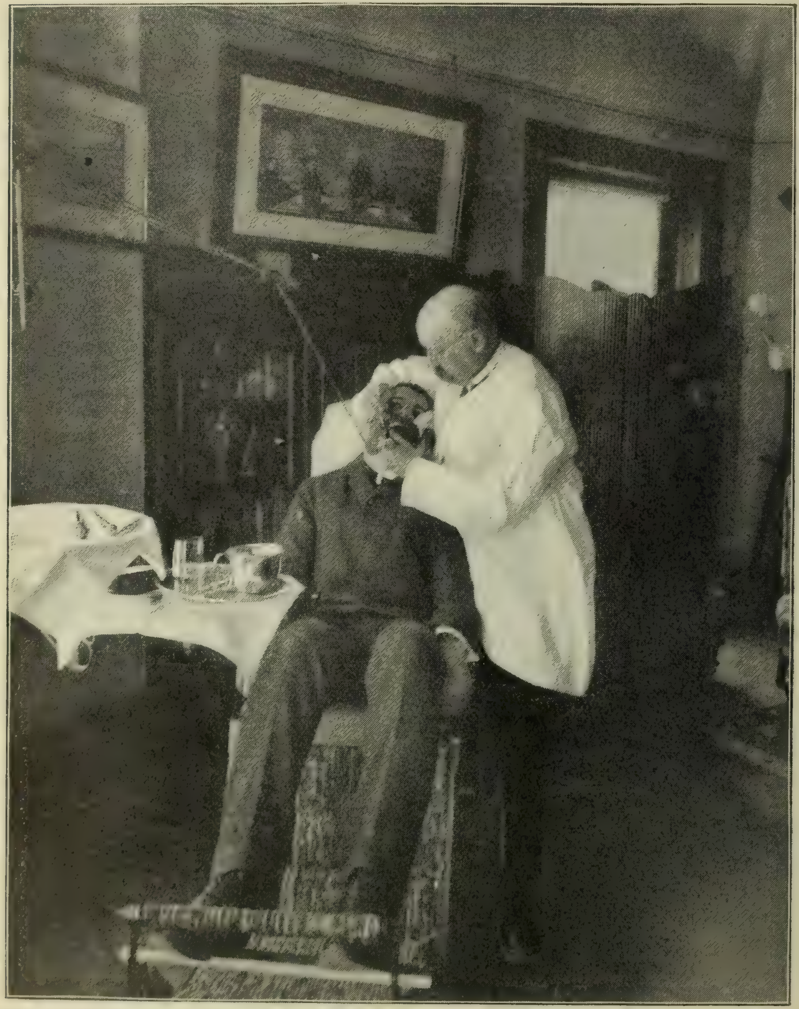
Page 120. "Examination of the palatal surface of the filling with a mirror will almost invariably disclose the fact," etc.

Page 121. "If the operator has a chair which will allow him to tip his patient back, so that he can see directly into the cavity, it would be a most advantageous procedure. If not, he must be skilled in the use of the mirror and depend upon it."

In the late Dr. Webb's "Notes on Operative Dentistry" we find a casual allusion to use of the mirror for reflecting light into the mouth.

May it not be assumed that the lives of Webb, Varney, and some other brilliant and successful operators might not have been so prematurely ended if they had conserved their energies by the methods here presented?

FIG. 5.



In Dr. Kirk's "American Text-Book of Operative Dentistry" (1897) we find the mirror mentioned in Chapter III, "The examination of teeth preliminary to operations," but not referred to in the thirty-eight pages of Chapter X, "The operation of filling cavities with metallic foils and their several modifications."

To illustrate this paper, instead of the so common projections on the screen, which are transitory, and which you cannot carry home with you, I have had made half-tone reproductions of six photographs, which have been distributed to each one present.

I will ask you first to take picture No. 1. I should say that, while quite ambidextrous, I am left-handed, and occupy the opposite side of the chair to most practitioners. Here I am using a plugger, the engine bracket being hung up and both feet so resting on supports as to give great stability for the exercise of force.

In No. 2 my foot has been changed to the governor of the engine, the bracket has been brought forward, and the bur is in use. You will notice that in other respects Nos. 1 and 2 are identical. This movement of the foot is made with no change of position of the body. Please notice the back seam of the coat.

Nos. 3 and 4 are back and side views, with the clothing removed, of the posture for introducing the gold in an upper right third molar. You will notice how erect is the body and head, how firm and well-braced is the operator for the exertion of force, which results from the position of the legs and feet.

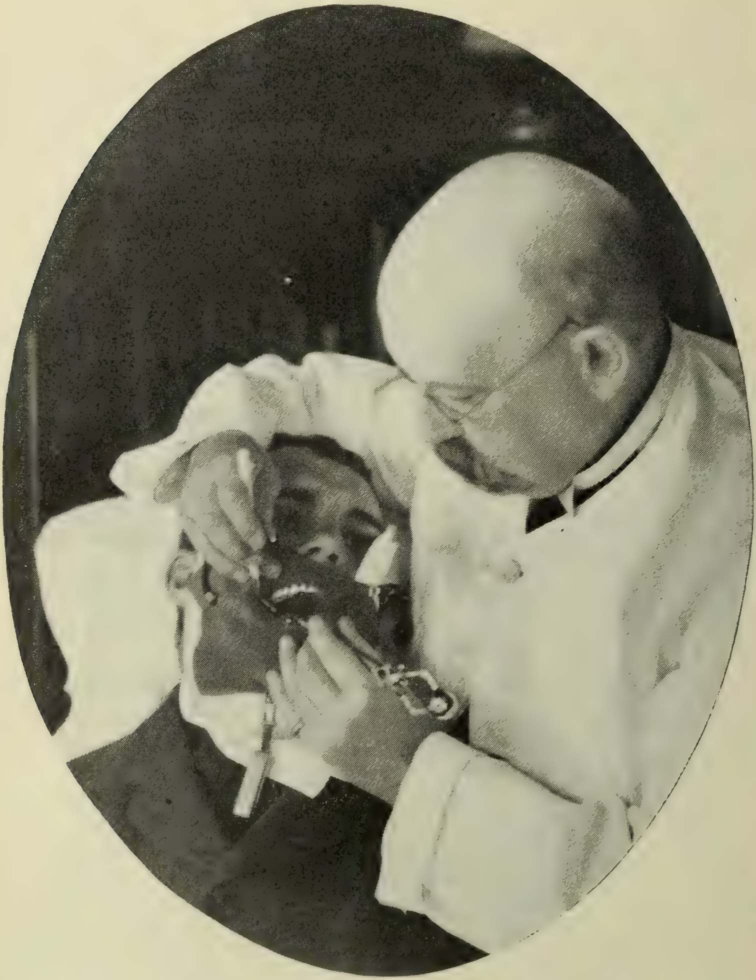
Passing now to No. 5, I will call your particular attention to the easy and comfortable pose of the patient while I am burring with the engine a cavity in the third molar, with the glass so held as to enable me to see all the time what I am doing, with my body in the same erect posture, sitting on the stool, with the foot on the engine governor. The left leg, I may remark, was touched up by the artist to bring it out, as in the photograph it was in the shadow. The governor can hardly be made out. In this picture, also, I call your attention to the spit-cup.

The fountain spittoon, sewer connected, has no right in a dental office in this day of asepticism. It cannot be so constructed or so cared for as to be surgically clean. It is unscientific, and offensive to modern hospital requirements. In our houses the sewer-connected wash-bowl has been banished from the sleeping rooms, while we place one, receiving the blood and filth of the mouth, right under our noses and those of our patients. Twenty-five years ago my esteemed patient, the late Dr. Henry J. Bigelow, taking up the clean and sterilized spit-cup which you see on the stand in this picture, said to me, "Don't ever give that up. It is the only correct receptacle for a surgeon."

No. 6 shows me condensing gold in the upper third molar. You will notice that, while my eye watches every detail of the process from beginning to end, the patient's head is not tipped back, his mouth is not stretched wide open; my head is above his, neither inhales the other's breath, but each is comfortable with the minimum of strain and fatigue.

The writings of my friend who will open the discussion, who for so many years has filled the office of correspondent in this society, have one most valuable peculiarity which is lamentably rare in the works of most of our authors, positiveness and dogmatism. Following his example, I assert dogmatically that the rubber-dam should always embrace as many teeth, the more the better, as will give full view of the teeth to be operated on, with more than enough free room for the glass, instruments, and hand. With one who knows how to do it the application of the rubber-dam is not painful, and demands not more than one minute more time to cover, as in this picture, eight teeth than two. This large working space saves much in time and convenience during the operation.

FIG. 6.



You will notice also the mallet which I am using. I doubt if many of you are familiar with it. Of all the mallets ever made, it is the only one which closely approximates in the character of its blow the hand mallet. It was invented by the late Dr. Swartley, of Chicago, and had a very limited sale, owing to the same cause which has restricted the use of the mirror,—namely, that it requires considerable practice to use it with ease and facility.

I am convinced that the origination and elaboration of the system of practice here presented was the silver lining to the attack of cerebro-spinal meningitis in 1863, and the weak back resulting therefrom.

Few men are living who have worked so many hours as I at the chair for so many years without a backache, notwithstanding that I have neglected all laws of health in regard to exercise, and have also been given to some dissipations and small vices.

I am so enthusiastic in this matter, and have such faith in its benefits, that were it consistent with the truth that I was its inventor and that in future years, when I am gone, it could be called after my name, I would desire no better professional memorial.

THE TRUE STATUS OF THE PULPLESS TOOTH.

BY D. D. SMITH, D.D.S., M.D., PHILADELPHIA, PA.

(Read before the National Dental Association, August 2, 1899.)

THE pulpless tooth as an organ is unique, and sustains unique relations among its confederates. It may be defined as a living organ with the greater part of its substance dead matter. Imperfectly understood, it has been perhaps more frequently the subject of experimental conjuration than of rational and scientific treatment. It seems to live in an atmosphere of suspicion and prejudice, for reasons not well defined nor consistently explained. In the minds of the laity it is universally associated with a "blackened" crown and rapid decay. In the profession it is almost as commonly esteemed an erratic organ, with sporadic disturbing tendencies impossible to control. By some it is thought to be of necessity an indicator of weather changes, and an inevitable sleep-disturber. Without accepting any of these as necessary conditions, we know that, as frequently treated, it is the cause of many aggravated and serious disturbances, as pericementitis, facial neuralgias, dental abscesses, and various pathological conditions of mouth, ear, and brain. This paper is contributed in the hope that the status of the pulpless tooth may be better defined, and that methods of practice may be suggested for its better conservation.

The largest and most practical conception of a tooth is not that which comes from studying it in its anatomical make-up of pulp, dentin, enamel, and cementum, with all the microscopical minutiæ relating thereto as found in the text-books; it comes rather with the view presented when studying the sources of its derivation, development, sustentation, utility, and kindred phenomena. For practical comprehension of the pulpless tooth no better division can be made of it than the natural one of crown and root, for in this we have distinctly marked the two sources of sensation and nutrition distributed to it. Consideration of a tooth, whether physiologically or pathologically, should never lose sight of the fact that its utility is wholly dependent upon its secure attachment in the alveolus, and that this attachment is not alone mechanical, but that it is a vital living union practically, if not wholly, *independent of the pulp*. This attachment or living union, so very important for both comfort and utility in the tooth, is passed over and dismissed in the text-books with the remark that it is an articulation belonging to the order gomphosis.

The permanent saving of a pulpless tooth rests upon the fact that there is a source of nutrition to the cementum maintained independently of pulp action, and that this nutrition of the root is practically unaffected by the destruction of the pulp. With the death of the pulp there is death of the whole of the *crown* of the tooth; the enamel and dentin are left absolutely without sensation or nutritive function. Whatever change comes to the crown of the pulpless tooth is of a distinctively disintegrating, retrograde character, tending directly to undermine its integrity. The disintegration will be rapid or gradual in proportion to the character of the individual tooth. The crown of a first permanent molar which erupts at six years of age, if devitalized at eight to twelve, will lose its cohesive strength, become fragile, and seem to melt away under the adverse conditions to which it is ordinarily subjected in the mouth in very limited time, while a thoroughly calcified tooth devitalized as to its crown at or near maturity will generally complete its normal period of usefulness without visible evidence of the important loss the tooth has sustained. These phenomena are so well recognized that a statement of them might seem trite but for the bearing they have upon other and less familiar facts and observations.

While with the death of the pulp there is complete cessation of vital function in the crown, the vitality of the *root,* except in its dentin, is not interrupted or lessened. The cementum, with its membrane, is the most important tissue for the conservation of the tooth; hence the peculiar emphasis attaching to the fact that the cementum receives its nutrition and life from a source independent of and practically unaffected by devitalization of the pulp. Articulation with the alveolus also, that most important of the tooth's relations, remains unaltered, and there are substantial reasons for assuming that the functions of absorption and nutrition are not interfered with. Pulp endowment, in so far as it affects healthful union between root and alveolus, might be dispensed with without detriment after the tooth is fully erupted.

It is in place at this point to allude to that practice (possibly "fashion," "craze," or "fad" would better express its meaning) which holds so lightly the virgin alveolo-dental articulation that it breaks it up at pleasure; in other words, it extracts, mutilates, and replants apparently without consideration or reason, and with no regard to the fact that this all-important relation once disturbed is never certainly restored. Such practice may attract attention and possibly gain fleeting notoriety, but it is wholly at variance with the laws governing nutrition as exhibited in other parts of the osseous system. Extraction, we believe, destroys the life of the cementum and the pericementum. Excision of the root, and more especially denuding it of cementum, deprives the root of the only tissue through which restoration to a vital, nutritive union with the alveolus is possible.

A replanted tooth may, for a time, present the appearance of having resumed its normal relations, but it is a matter wholly undemonstrated that the pericemental membrane, when once its connection with the alveolus has been broken by extraction, ever resumes its true function,—that of nutrition of the cementum. Replantation under the most favorable conditions, as, quick replacement of single-rooted occluding teeth, with no disturbance to root or membrane, is but an experiment in any case, and is frequently, if not usually, followed by beginning absorption of the root within a brief period. The period of usefulness for such a tooth is bounded by months rather than years, so that if the end sought is permanent restoration to usefulness the object is not often attained. "Extraction," "excision," "treatment out of the mouth," "replacement," may sound to the ear as of a dento-surgical operation of magnitude and importance, but the procedure is believed to be unjustifiable from any surgical standpoint or from any good results yet born of it, it being physiologically incompatible with the office of the tissues involved. And if this be said of *replanting* under favoring conditions, what shall be said of the modern operation of *transplanting,* that process which selects months-old, dried specimens to plant in artificially prepared cavities in the jaw? Can any preparation of such a root, as shaping, polishing, filling, or disinfecting, restore to its dead cementum or pericementum the life which shall reunite it in a living union with osseous tissue in which it may be implanted? As well might we look expecting to see the fulfillment of Ezekiel's vision in the valley of dry bones, or that wonderful prophecy of a young professor in one of our dental colleges whose raptured vision beheld teeth shaped from animal ivory, and even porcelain, planted in openings made vacant through extraction, as that the dried cementum on the root of an extracted tooth shall ever be revivified and renourished through the instrumentality of pericemental action. One of two results must follow the operation of replanting or transplanting a tooth: either there will be renewal of the nutritive function in cementum and pericementum, or there will be elimination of the tissues of the root through absorption or suppurative displacement. Living tissue abhors dead matter, and cannot be induced into permanent association, much less vital union, with it. The reunion between the implanted portion of the tooth and the jaw which for a time seems to take place is more apparent than real; the discolored gum-tissue and the retarded circulation reveal that the union is more mechanical than vital.

But to return to a more careful study of the root portion of an undisturbed pulpless tooth. *It* is a vital, living organ, retaining and exercising function as when the pulp distributed sensation and nutrition to the dentin and enamel. Engorgement of pulp-tissue resulting from a recent devitalizing application may, and frequently does, produce hyperemia of the pericementum, but the resulting irritation quickly subsides on removal of the devitalized pulp. There are no necessary untoward cemental or pericemental symptoms,—neither change in the office work of these tissues following the removal of the pulp,—hence this operation, accompanied with proper disinfection of the tubules and of the intertubular matter, necessarily implies uninterrupted normal function of the tissues which furnish vital attachment between root and alveolus.

Pulpless teeth when properly treated are wholly comfortable; not weather indicators, not erratically subject to periodontitis, alveolar abscess, and other pathological conditions, but teeth with a favorable prognosis in all essential particulars.

Pulpless young teeth, that is, teeth which have lost their pulps before the vascularity of the cementum has been restricted by the contraction of its lacunæ and canaliculi through deposits in its substance, are far more subject to cemental accretions, or so-called exostosis, than the same teeth with living pulps. This is by no means an unfavorable condition, as through it the territory of normal circulation is increased to the benefit of the tooth.

A noticeably frequent result of pulp-destruction is a closer, firmer union of root and alveolus. This is probably due to two causes: first, an increased tendency to a deposit of cemental tissue on the surface of the root, and, second, the entire obliteration of calcific deposit through pulp influence. A pulpless tooth which has never been the subject of pyorrhea alveolaris, the author, from careful observation, believes to be practically, if not entirely, exempt from that trouble; and devitalization and removal of the pulp in the beginning of the disease in individual instances is attended with the most satisfactory results.

The value of a pulpless tooth should not be estimated from the condition of the natural crown, as *it,* with present methods for permanent crown restoration, is the least important part of the tooth. The *root*—the living part—and its surroundings, that upon which the permanent comfort and retention of the tooth depend, should always form the basis of judgment and a diagnosis. If the root portion of the tooth is firmly in vital union with the alveolus, and without pyorrheatic tendencies, the condition of the crown, whether much decayed or broken, or whether wholly gone, is not a matter affecting the possibilities of restoration in the smallest degree. A crown having the appearance of the natural tooth, and practically indestructible, can be supplied on any good root, and on many very badly broken ones, in any part of the mouth. That root which has an uninjured pericemental connection never questions as to whether the crown it is supporting is natural or artificial, but performs all the functions of a tooth with uncomplaining fidelity.

It is generally easier and more satisfactory, because of facility of access, to deal with a root or roots devoid of crown than with a tooth having a crown susceptible of contour restoration by means of a so-called filling. We conclude, then, that the pulpless tooth, with or without a crown, is a living organ of the economy, and to be treated as such. It may be removed or extracted when obviously demanded for cause, but *never for treatment.* Special care is demanded in its treatment not to pierce or otherwise injure the cementum or its membrane; to thoroughly remove all pulp decomposition, and disinfect the tubular and intertubular matter. To accomplish this there may and should be rather free removal of the dentin from the thicker portions of the root, care being exercised not to trench upon the cementum and to leave the apical third practically undisturbed. The one root-dressing and disinfectant than which nothing else is demanded, as nothing acts so well, is pure wood creasote. If it is proper to speak of specifics among remedies, creasote is a specific as a root-dressing, acting to promote harmonious relations between the devitalized dentin and the living cementum. It may be tightly impacted on raw cotton and sealed in a root from which an aseptic pulp has been removed, but never so applied in a septic root.

Removal of so much of the dentin as may be determined upon, enough at least to gain free access to the root-canal, and thorough cleansing of the root from all septic matter, should be followed first by instrumental applications of the creasote in the canal, and this in a few hours by a few fibers of saturated cotton placed loosely in the canal; and this again by cotton more closely packed, until the creasote and cotton can be tightly sealed in the root. When the cotton withdrawn from the sealed root has the odor of the creasote only, it may be permanently sealed with filling-material, or with a post in cement, with perfect assurance of future comfort.

Successful treatment of a tooth having a septic pulp, accompanied with tendency to pericemental trouble, requires judgment, tact, and experience, which no details in a written article can impart. This one point may be emphasized to great advantage,—viz, no root should be sealed with a permanent filling without first testing it with a cotton and creasote dressing, and not until the creasote permanently overcomes all other odors is the root ready for filling.

It has yet to be fully comprehended that "*methods*" of filling, as well as filling-materials themselves, are wholly subordinate to preparatory treatment of the root; and that that treatment is best which best promotes healthful nutrition of the cementum, remembering that whatever assistance may have been imparted through pulp influence from the living dentin is now withdrawn. Hence the effort should be to hold the devitalized dentin forming the body of the root in harmonious relation to the life of the cementum. And this object is much more certainly accomplished with creasote than with any other remedy.

It is not the purpose of this paper to discuss root-filling materials nor their methods of use; neither crowns, nor methods of crowning; but it is wholly in place after an experience of some fifteen years in the use of amalgam for setting the Bonwill crown to raise a voice of warning against the use of amalgam in roots, either as a filling-material or for the setting of posts. This latter operation can be done with greater facility and with equal security in the use of the non-irritating oxyphosphates, themselves reliable root-fillings and of adequate strength for securing posts. The oxychlorids are perfect root-stoppings, and to be preferred above all others in pulpless teeth retaining the natural crown.

Reference has been made to the fact that a crown having the appearance of the *natural organ* can be securely applied to *any* root having the alveolo-dental articulation in a normal physiological condition. Emphasis should be given this statement, and an energetic and most emphatic protest raised against the increasing use, both in crown- and bridge-work, of the disfiguring gold crown. Perhaps nothing cheapens dentistry more or more justly subjects it to jest and ridicule than the present unseemly and wholly unnecessary display of gold in and on the teeth. Gold crowns are admissible only on the roots of molars, where they are not exposed in ordinary movements of the mouth. Incisors, cuspids, bicuspids upper and lower, and upper first molars can be readily crowned with a band and post, so constructed that the porcelain tooth only shall be exposed, while all strain of mastication and occlusion is thrown upon the gold, which is entirely concealed. For first and second individual lower molar roots there is nothing comparable to an all-porcelain crown, of a construction which permits of fitting and setting the posts independent of the porcelain, on the principle of the Bonwill crown. Such crowns carefully adjusted and set in oxyphosphate, or, better, a mixture* of oxyphosphate and a good amalgam, form a tooth which for durability and esthetic appearance leaves nothing to be desired.

We are thus led to the inevitable conclusion that the pulpless tooth is a living organ, maintaining, when properly treated, the same vital relations with the alveolus as when it carried a living pulp; that it is susceptible of perfect esthetic restoration, and that for comfortable retention, utility, and durability its prognosis is most favorable.

EXTRACTION AND DELAY VERSUS EXPANSION AND EARLY INTERFERENCE IN THE TREATMENT OF PROGNATHISM.

BY RODRIGUES OTTOLENGUI, M.D.S., NEW YORK, N. Y.

(Read before the National Dental Association, August 1, 1899.)

MR. PRESIDENT and fellow-members of our National Society: Gentlemen, I desire to present for your consideration the histories of two cases from practice which taken singly and separately might not justify my intrusion upon the society, but studied together I believe they so well illustrate the mischievousness of certain methods of procedure heretofore considered sound by many of our best men that a description of the two cases in detail will merit your attention.

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*The mixture of cement and amalgam above referred to forms a practically new cement. My attention was first called to the valuable properties of this cement by Dr. L. C. Taylor; afterward I had the pleasure of seeing it elaborately demonstrated by Dr. Clinton W. Strang. It is produced by first preparing a mix of amalgam as for filling, and following this immediately by mixing a good cement as for same. While the amalgam and cement are still in working condition, they are incorporated by mixing together in about equal parts. The resultant compound takes much more the nature of the cement than the amalgam. The color is sparingly improved, but the adhesive properties are greatly increased in the new cement. It attaches itself very tenaciously to dry dentin, and stands the wear of mastication much better than any plain cement. This mixture of cement and amalgam is valuable in many cases in practice, and should be more generally known.

About two years ago a case came into my hands which offered what seemed to me to be a rare opportunity to study certain modes of practice, and I determined to keep more detailed records than usual. At the time I had already bestowed several months' work upon a case of prognathism of the upper jaw in the mouth of a miss of ten, in which case I was working specially to demonstrate the advisability of beginning early with such cases, and by early I mean prior to the eruption of the permanent cuspids. In order to avoid confusion in the minds of my hearers, I shall designate the case already begun as Case A, and the other as Case B.

Case B was another prognathous upper jaw, and in this mouth also the temporary cuspids were still present, though the patient was nearing her fifteenth birthday. The previous history was one of extraction and delay, the first permanent molars having been removed. The family attendant who had advised the extraction of these teeth subsequently very kindly presented me with a model of the mouth made at the age of ten. I was immediately struck by the great resemblance between this model and that of my Case A.

FIG. 1.

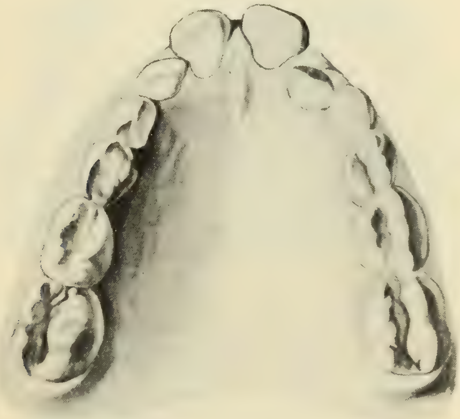


Fig. 1 shows the upper jaw of Case B as it was at the age of ten, while Fig. 2 shows the upper jaw of Case A at the same age. The resemblance is startling, for not only are the same teeth present, but we find practically the same malposition of the teeth. I am not able to show the extent of the prognathism in Case B at the tenth year, because articulated models were not preserved, or at least were not furnished to me; but it was very probably the same as in the other mouth, judging from my close observation of the two cases and from measurement of the two mouths at this early age, which show them to be almost identical. I will simply record, without comment at this moment, the fact that in this case, Fig. 1, the two permanent molars were removed, although sound.

Let me now proceed with the histories separately. As already stated, Fig. 2 shows the palatal aspect of the jaw in Case A. The extent of the prognathism is well shown in Fig. 3, your attention being especially called to the formation of the alveolar process in the incisive region. A study of Fig. 2 alone might lead one to suppose that the lateral incisor was the only tooth out of place, while after seeing the articulated models, Fig. 3, one might say that this same lateral was the only tooth in line, and that the other three incisors should be reduced to conform with it. In the correction of this case, however, after reducing the prominence of the centrals and of the opposite lateral, this instanding tooth was carried out somewhat.

Fig. 2.

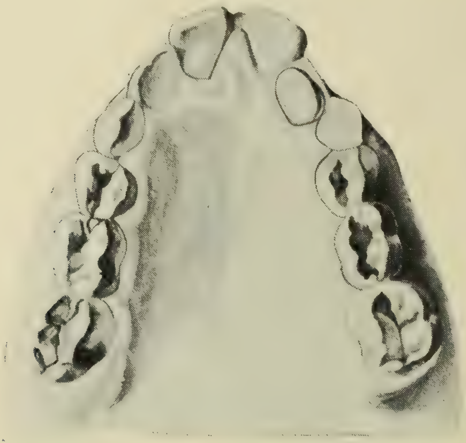
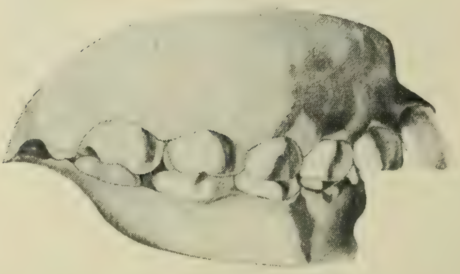


Fig. 3.

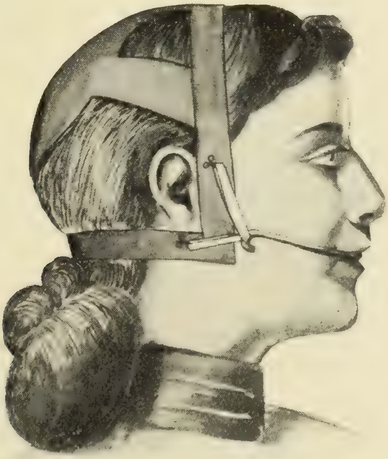


In undertaking this case at so early a period, I was seizing the opportunity of gratifying a long-cherished desire. I have believed for years that a jaw of this character, taken in time, could be so managed that eventually all asymmetry would disappear, room having been provided for all the unerupted teeth; and that this could be done in precisely that class of cases where usually at the age of fourteen or thereabout it is common practice, and frequently an absolute necessity, to sacrifice a bicuspid on each side. It is a great gratification to me to have carried this case to a successful issue, the jaws at the present time being in good pose, the teeth in good occlusion, the asymmetry, both external and internal, having been corrected, and all of the permanent teeth being in place, of course not including the third molars.

I will as briefly as possible give the details of treatment, dwelling only on such as may have special significance or interest.

The first requisite in undertaking this case was to proceed by such means as would provide stable anchorage for the retainer which would necessarily be worn for several years, especially during the period of shedding of the temporary teeth. It is manifest that at this age the first permanent molars, barely protruding from the gum, would have been of little service as anchor teeth for any internal mechanism. In fact, I venture to say that it would have been practically impossible to rely upon these short teeth as supports for bands or clasps in any system of reduction known to me. Moreover, even were it possible to so utilize these teeth at the age of ten, it would have been a false step, because if disturbed in their sockets while the anterior teeth were being retracted they would have been of lessened utility as anchors for retaining the incisors in their new position, especially during the eruption of the four bicuspids and the two cuspids yet to appear. Consequently, in this or in any other similar case undertaken at this age, I can see no justifiable method except the skull-cap.

Fig. 4.



After many and varied experiences with many styles of skull-caps, I have had the pleasure of using the one shown in Fig. 4 in numerous cases without trouble of any kind in a single instance. This cap is no haphazard product, but is the evolutionary result of many efforts to obviate unsatisfactory features of caps used in previous cases, not the least of which is undue pressure in the frontal region. This cap brings the resistance exactly where it should be, and where it is sustained with least discomfort; that is to say, at the crown of the head. For these reasons it may be advisable to take a moment to tell how one may be constructed.

The cap itself is of leather, and is lined with leather as well. The chief beauty in its construction is that each piece may be cut from a single piece of leather, so that there need be but four short seams, and these where they exert no irritating friction. The round piece, the skull-cap proper, has a piece projecting forward and backward, each in turn carrying strips at right angle to itself, while on each side another wider and shorter piece extends forward to meet the strap which passes down from the frontal region. Of the four seams mentioned two are seen in the figure, the others being similarly situated on the other side.

In making such a cap I begin with a sheet of stiff manila paper and cut out the skull piece, with simple projections forward and backward, and the two wide side pieces. All are made longer than required. The skull piece is slit in places, and, when fitting to the head, pins hold the lapped places where these splits were made. A narrow strip is then pinned at the proper place on the front and back extensions, and these in turn are pinned together where they should meet under the ear. Excess is cut away, and we have a pattern of the hat in paper. A similar cap is cut from linen buckram, and this is more accurately fitted to the head, care being taken to have it exactly as it should be; this precaution is necessary because the leather worker will follow the pattern blindly, any departure, if made, being usually in the wrong direction. I generally have had no difficulty in having my caps made by any practical shoemaker, and the cost is about two dollars.

The latest improvement that I have made in this cap has been to reinforce the terminals of the front bands with German silver, inclosed within the two pieces of leather. This piece of metal extends from near the extremity of the band to a point above the hook. This hook is fastened with thread, two holes being first drilled through the leather and metal to permit the passage of the needle. This stiffening is very advantageous, preventing wrinkling at this part, which is liable to occur from the unequal strain of the elastic bands; but the metal is not carried up high enough to make the band uncomfortably rigid against the face.

We may now return to the specific case, though I should mention as one more detail in regard to the skull-cap that though the black cap is best for brunettes, when dealing with a blonde the color of the leather in the cap should match the hair as closely as possible.

The first active step in this case was the widening of the jaw, which was readily accomplished. Examination of Fig. 3 makes it plain that not only must the crowns of the central incisors be moved inward, but the process itself must be bent; consequently the teeth should be carried bodily backward. It is needful to vary the bits used with skull-caps in accordance with the service which they will be required to perform. The bit used at the outset in this mouth is shown in Fig. 5. It is in effect a cap swaged to fit over the incisors so that the two teeth thus held were moved as one, force being so directed by the placing and direction of the arms that the teeth and process were moved inward. The caps are of platinum, and the extension arms are of rigid brass wire. These are soldered together with gold solder, and the bit is then heavily gold-plated.

It will be noted that none of the usual provisions for movement of the arms, such as ball and socket joints, are provided. The theory of such apparatus is that the arms would otherwise trouble the child at night. I have had no complaint of that character brought to me by either children or parents, though I have never provided for such movement. After this last admission it may be thought that I am incompetent to judge of the action of movable arms, but, theoretically at least, I see many advantages in the rigid arm, the chief being that the child in sleeping does not produce unequal tension by pressing one arm against the face, the other being correspondingly pressed outward, thus causing more tension on that side upon which the child does not lie; a matter of importance when we remember that from habit one sleeps on the same side always. The rigid arm, on the contrary, is simply pressed into a soft pillow, and the tension of the elastics on both sides remains undisturbed. In regard to elastics, I formerly utilized bands as are seen in the figure, but in the cases under discussion and in all since I have adopted a different and more satisfactory method. I supply the patient with a box of the ordinary small elastic bands of commerce. When the skull-cap and bit are first introduced they are held in place by using just enough of these elastics to keep them steady, usually two bands over each hook. Thus the child endures no pressure, or very little, while growing accustomed to the apparatus. The child is permitted to remove this bit for meals, and easily replaces it herself. She is instructed to increase the number of elastics from time to time, and she is told that if at any time the teeth should grow to be sore she may remove elastics sufficient to give relief. By this simple means the force may be increased or decreased very gradually, and there is no reason why any serious pain should be experienced at any stage of the operation.

FIG. 5.

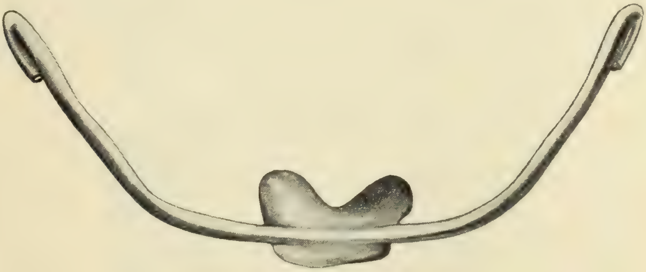
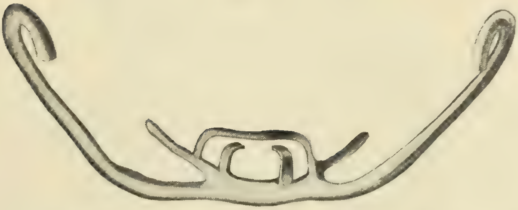


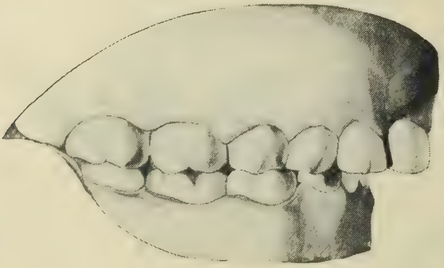
FIG. 6.



This bit, Fig. 5, was used until the two incisors had been carried back into line with the prominent lateral. The bit was then discarded, being replaced with the one seen in Fig. 6. Here the teeth are held in a cage-like fixture which allows them to be moved individually rather than collectively. Thus should the lateral reach its proper place soonest, which it usually does, the centrals can be carried farther in, without affecting the lateral, by merely bending outward that part of the wire which touches the lateral. Other alterations would occur to the operator in accordance with the requirements of the case in hand.

By these means the reduction was carried to a point where the jaws appeared as seen in Fig. 7, a very symmetrical arch having been attained. It would appear perhaps from the figure alone that the task was far from accomplished, but a study of the face as well as of the occlusion demonstrated that the fault originally lay not alone with the upper jaw, but that the prominence there was doubly noticeable because the lower jaw occupied an abnormally retreating pose. To correct the asymmetry of the features it was necessary to alter the pose of the lower jaw by jumping the bite, that simple operation which has excited so much adverse criticism.

Fig. 7.



The method of jumping the bite as announced by Dr. Kingsley so many years ago is well known. An inclined plane is erected upon a plate for the upper jaw, which, by engaging the incisors of the lower jaw, compels the patient to close with the lower jaw in the forward occlusion. There are two periods, however, when this is far from a simple operation. After the eighteenth year, and sometimes sooner, the habit is so fixed that the patient does not readily break it up, and the result is that in attempting always to close the lower jaw in its accustomed retreated position the inclined plane operates to force outward the lower incisors. The same would be true in a very young patient, the lower incisors moving outward in such cases because they are so insecurely fixed in the jaw.

It was necessary therefore in this young patient's case to adopt such a fixture as would jump the bite without danger of projecting the lower incisors. The apparatus used is seen in Fig. 8. It is made of iridio-platinum, and the inclined plane is carried around the arch so that it engages all the teeth of the lower jaw, thus obviating any undue influence upon the incisors. At the same time this appliance carried a retaining wire to restrain the three incisors which had been reduced. The wire projecting from the front of the plate, as seen in the illustration, was a temporary device to carry the instanding lateral out to line. When that was accomplished it was removed, a slight extension of platinum plate taking its place to act as a retainer. In passing from this figure I would call attention to the manner in which the retaining wire is attached. It is common practice, I believe, to use a wire in a continuous piece, allowing it to pass between the teeth and operate as clasps. It is better to make the clasps separately and attach the retaining wire to them as shown, as by this means either the clasp or the retaining wire can be bent without affecting the other.

FIG. 8.

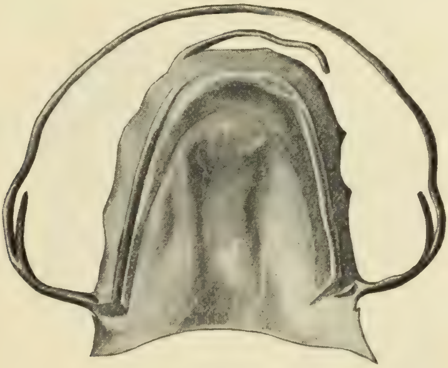
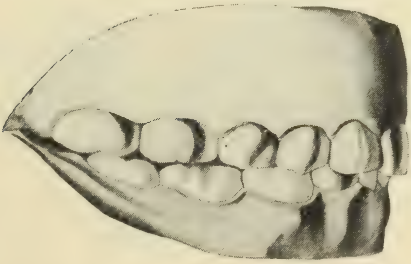


FIG. 9.



With this appliance for jumping the bite in place, the closure was as seen in Fig. 9. The apparatus was worn from the middle of July until the following January, when the patient had grown so accustomed to the new bite that this was taken from her and a retainer supplied, which was simply a plate for the roof of the mouth with the retaining wire exactly as in Fig. 8, the only difference between the two being the absence of the inclined plane.

The patient was under constant observation, and when the temporary molars were lost new clasps were fitted to the plate, passing behind the first permanent molars, which by this time had sufficiently erupted to be so utilized. It was pleasant to see the various teeth as they appeared become engaged by the retaining wire, and so led down to proper alignment within the arch. Fig. 10 is from models made within the last three weeks.*

There is still some work to be done on this case, and this will be undertaken in the autumn. But, all the permanent teeth having erupted, it is safe to assert that the primary attempt has been successful. The great protrusion of the upper jaw has been corrected; the lower jaw has assumed a proper pose; the face has been beautified, and yet no tooth has been sacrificed. It is also worthy of mention that though this child has been constantly wearing plates for over two years, no speck of caries has attacked either temporary or permanent teeth. This may be attributed to the nature of the fixtures used. For the last three years my main reliance has been upon plates of iridio-platinum when plates were needed. These are strong, and alterations can be made in a few minutes at any visit, which is especially advantageous in many cases where crises occur unexpectedly, and perhaps at times when the office work is overcrowded. But the chief advantage is from the prophylactic standpoint. All fixtures where possible, and certainly all of this class of retainers, are removable. The patient is therefore instructed to remove the retainer before eating, and to cleanse it and

FIG. 10.

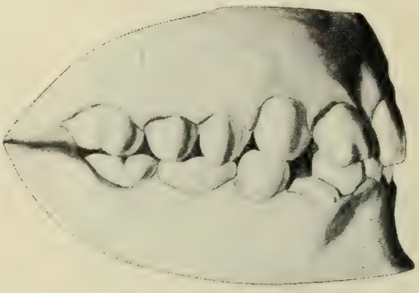


FIG. 11.

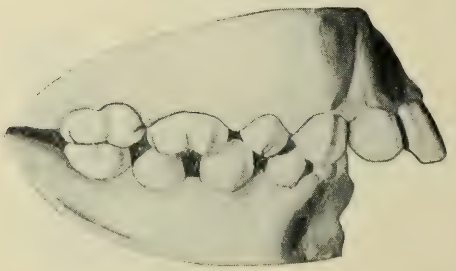


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*Fig. 10 erroneously makes the lateral incisor appear to be at an angle, whereas it is really still upright as seen in Fig. 9. Fig. 10 is introduced to show that the permanent cuspid and bicuspids have erupted in good alignment, without protruding the arch.—R. O.

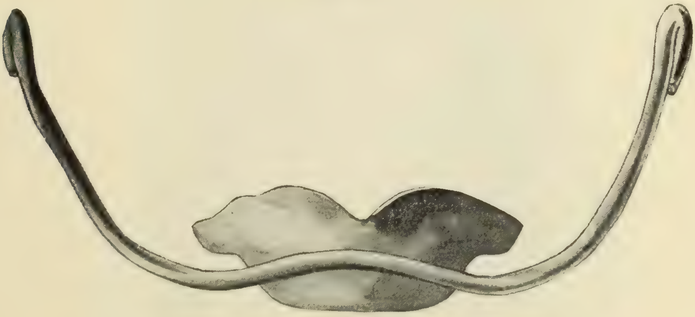
the teeth before returning it to the mouth. Moreover, the retainer is to be boiled in soda and water daily.

The above, gentlemen, is the record of a successful effort at expansion and early interference, and you have seen the appearance of the mouth at the age of thirteen. Let us contrast it with the mouth of Case B as it came to me when nearly fifteen years of age. The extent of the protrusion is seen in Fig. 11.

I will also ask those who may take part in the discussion to compare Fig. 11 with Fig. 1, and to observe how nearly the second permanent molars have taken the place of the first, which were removed; and if any can explain what was gained by the extraction I should be glad to hear his argument, as I have failed to find any rational excuse for this method, either from the study of this particular case or that of a number of others that have come under my observation.

The treatment of this case was along the same lines as were followed with Case A. The variations in the treatment, however, made necessary as the conditions developed, will be instructive, arguing as they do that no binding rules may be laid down for the management of any case in orthodontia. These two cases certainly seemed similar, yet they differed greatly in certain particulars of treatment, due in part to the difference in the ages of the patients.

FIG. 12.

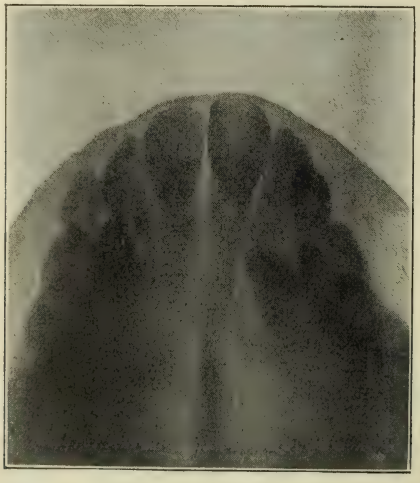


Once more we find the alveolar process involved seriously in the protrusion, and consequently the same style of skull-cap was used; in this instance made of light tan-colored leather, and the first bit is shown in Fig. 12. It is upon the same principle as the bit Fig. 5, but here it engages four teeth instead of two. It extends high enough to include the process in the movement of the teeth.

All went well with this case until about the end of the eighth week, when it was observed that the incisors upon the right side were moving more rapidly than those upon the left. It should be explained here that while it might seem that the work would be facilitated by the removal of the temporary cuspids, it would be hazardous to extract them. They are preferably left in so that their roots may aid in moving the undeveloped cuspids backward, and it was upon this theory that the cuspids had been retained in this instance. But when it was observed that the teeth were moving irregularly it was at once suspected that the permanent cuspids might not be in their proper positions. An X-ray photograph was taken for me by Dr. Wm. J. Morton, and this disclosed the fact that both cuspids were developing within the arch (Fig. 13).

With this knowledge the skull-cap was temporarily abandoned, and a fixture was designed to bring the arch into a symmetrical curve again. By the time this was made and placed in position the cuspid on the right side had slightly protruded through the gum, appearing within the arch. Fig. 14 shows the condition at that time. We here observe that the left incisors are bulging outward, while on the right side the tip of the approaching cuspid is shown.

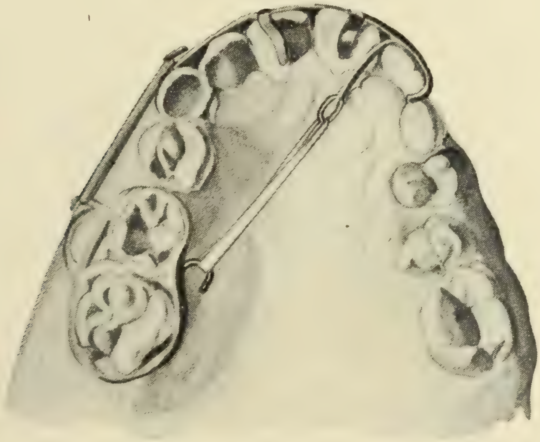
FIG. 13.



In undertaking to work from within it was essential not to disturb the second permanent molars, which were to serve as final anchorage for the retainer; moreover, both teeth were very short, so that at that time neither would have held a clasp. A band of pure gold was fitted to the second permanent molar on the right side, this being accomplished by relying upon a plaster model of the tooth and carving away the gum at the back. A similar band was made for the bicuspid, and these were united by stout pieces of clasp gold on palatal and buccal sides, so that the fixture should be sufficiently rigid to enable me to utilize the two teeth for anchorage as though they were one six-rooted tooth. The fixture was further reinforced on the buccal side by a bow-like extension which had upon it a hook. This bow was used chiefly because I wished the hook to be high up, that the traction of the rubber should be in proper direction to prevent elongation of the incisors. The hook alone might have served this purpose, but a single arm extending up so high might have irritated the tissues of the cheek. Moreover, by erecting this arch I more certainly secured rigidity. In conjunction with this a T was used, the palatal arm passing between the central and lateral incisors on the left side. The two parts of this fixture, together with the elastics, are well shown in Fig. 14; and in passing from this fixture I will call attention to the approaching bicuspids on the left side, which are seen to be coming in within the arch and malposed, and this in spite of the extraction of the first permanent molar, which would theoretically have given these teeth abundance of room.

The arch was restored to a symmetrical form by this means very quickly,—I think within two weeks. The temporary cuspid had been retained during this period, but it was then removed to give room for the advancing cuspid. The skull-cap was resumed, but, the process having been sufficiently bent inward, or nearly so, a different bit was used, one similar to Fig. 6.

FIG. 14.

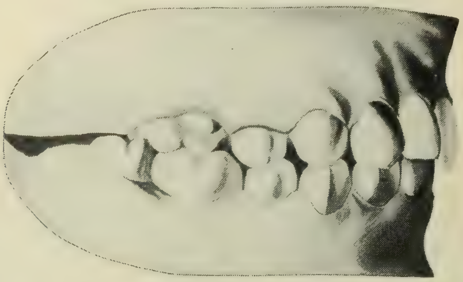


As in the first case, here also the external asymmetry demanded that we should jump the bite, and after retracting the upper arch this was undertaken; the plate used here being of iridio-platinum but the inclined plane was placed only in the incisive region.

After wearing this for a few months the new habit apparently had been inculcated, and the fixture was abandoned for the retaining plate. But again the age of the patient affected the treatment. In the first instance the bite-jumping apparatus when taken away was taken away from the child finally, whereas in the second, when the simpler retainer was supplied, the patient was instructed to wear the retainer in the daytime and the bite-jumping plate at night; and this was done for three months longer, when it was abandoned for the retainer only. This precaution was observed because with the older child the abnormal habit of closure having continued longer, would be more difficult to break up.

The present condition is shown in Fig. 15, which was drawn from models made two weeks ago. This shows an apparently completed case, but had the drawing been made from the opposite side it would be seen that the permanent cuspid is still missing, so that a gap appears. In this mouth development of the teeth has been very slow, and this tooth especially is very tardy. As the cuspid on the opposite side had become fully developed while this was not yet piercing the gum, I probed for it last autumn and found it buried at a great depth, and I feared that it would there remain. I therefore concluded to attempt to induce its eruption by operation. At the first operation, after cocainizing the gum by cataphoresis, I used a circular trephine knife of large diameter, making an incision down to the tooth, and then dissected away the tissue which covered it. Thus the tooth was disclosed, but at a depth of fully a quarter of an inch, which is deeper than it sounds to be. This wound was kept open with aseptic packings, which were retained in place by the retaining plate which covered it. These dressings were continued for about ten days, and the parts were then left to themselves. The irritation thus set up caused the eruption of the tooth to proceed, but eventually the gum closed over it again, healing completely. The tooth, however, had come down considerably. A second operation was performed, more tissue being removed this time, so that a considerable portion of the tooth was disclosed; the packings were used for a time, and then the retainer was cut away to allow the approach of the tooth, which has been continuous though slow. An examination of the model will show that the tooth is now fairly through the gum, but erupting far within the arch. There will be abundant room, however, to get it into place this winter.

Fig. 15.



Before dismissing this case I wish to make reference to the advantage of the metal plates in accomplishing the minor details of the regulation. Thus the bicuspid on the right side was moved back to give room for the approaching cuspid by merely soldering to the plate such a spring of wire as would be used in Dr. Jackson's method. By thus making room for the cuspid it was pleasant to see this tooth, which was at first coming in somewhat twisted, right itself, so that no special attention was given to it. Again with other springs the bicuspids on the opposite side were forced outward into correct position and occlusion. Such spring wires are easily soldered to the plate, and as easily removed. In many simple cases the plate which I utilize in this manner for the regulation serves as the final retainer. Again I have to report that, using the same prophylactic precautions, not the least sign of caries has appeared in this mouth, Case B, all the teeth being in place except the approaching cuspid, and none disfigured by even the tiniest gold filling.

The chief purposes of this paper may be summarized as follows:

First. That by early interference and expansion in cases of protrusion the upper jaw may be made large enough to receive the unerupted teeth, thus in the end not only attaining correct occlusion and beautified external symmetry, but retaining all the dental organs. If such a case has been reported before it has escaped my notice.

Second. The theory of removing the first permanent molars in cases of upper protrusion, with the idea that the jaws will fall back, is a false one, attended by many evils, not the least of which is the fact that subsequent regulation is made doubly difficult because at the age when it would be attempted, in accordance with the plan of delay, such waiting having proven to be in vain, the second permanent molars, which must serve as anchorage, would be as little developed as were the first permanent molars when the latter were extracted. But the main difficulty with this plan is the unnecessary loss of two important organs, for it must be remembered that I am speaking of the extraction of perfectly sound teeth.

Third. That with the use of proper fixtures, made of pure metals where they enter the mouth, perfect oral prophylaxis may be assured, even extensive regulation being possible without the least danger of inducing caries; and this is especially true if the fixtures are removable and can be boiled, and if such fixtures are not retained during meals, by which precaution it is certain that food cannot be lodged upon them.

Fourth. That the eruption of tardy teeth may be facilitated by operative measures.

In conclusion, I must express regret that I am unable to show the faces of these children. I have not in recent years made masks of the faces of my patients, because I have concluded that these plaster casts are cold and rigid, and do not adequately show the improvement effected. I prefer now to have profile photographs, which give more life-like representations. I have such photographs of these cases, and these show that both children have developed into beauties; indeed, the parents of the older girl are so pleased with her appearance that she has recently had her portrait made by one of our most prominent portrait painters. But I have promised in both these cases not to publish these photographs, and consequently I deem it to be my duty not to publicly exhibit them. These and others, however, may be seen at my office by any of my *confrères* who may honor me with a visit.

HARE-LIP AND CLEFT PALATE.

BY THOMAS FILLEBROWN, M.D., D.M.D., BOSTON, MASS.

(Read before the National Dental Association, August 1, 1899.)

VERY little has been added to our knowledge of the cause, frequency, or description of hare-lip or cleft palate during the last generation, while within the last decade considerable progress has been made in the surgical treatment of these deformities.

The cause is universally conceded to be arrest of development, but as to what the cause of arrest of development is opinions differ widely. As a matter of fact, it is very imperfectly understood, and seemingly must remain a matter of conjecture rather than demonstrated fact.

Mental impressions, shock, and heredity are the essential causes to which disturbance of development is attributed.

The fact that the fetus is fully developed either perfect or imperfect before the end of the tenth week, the lips being completed by the end of the seventh week, leaves but a small margin for mental effects. The absence of records of cases where any mental impression could be traced, and the frequency of cases where perfect children have been formed under circumstances when the mental impression must have been powerful for the wrong, raises a question as to the effectiveness of this as a cause.

A considerable number of deformed children have been born in successive generations of the same family, enough perhaps to lead to the conclusion that in individual families heredity may be considered established, but the number is relatively so small that this cannot be considered a potent factor in the generality of cases.

Shock is so frequently a cause of defect in development that it is entirely reasonable to consider a hare-lip or cleft palate as one of the results.

To my mind what may be termed "accidental" is the most common cause. By accidental I mean one of the thousand incidents that may disturb the physiological action without the knowledge of the patient or attracting the attention of the observer. I mean the same causes that produce congenital club-feet or hands, an imperforate anus, an open foramen ovale, hernia, cataract, or other "morbi connati." This reasoning brings us back to the point from which we started: "We do not know."

The deformity may extend from the eye to the uvula, or it may include only a part of either portion, showing that the development may have been interfered with at any stage and afterward normal action resumed.

Records of maternity hospitals in Europe show that the frequency of this deformity is about one in eighteen hundred among the infants born there, but this cannot indicate the proportion to the population.

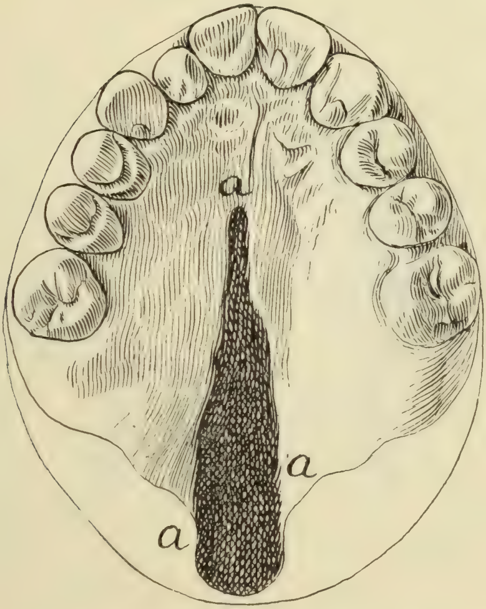
There are more clefts of the left side than of the right in the proportion of eight to five; of double cleft only a few. The deformity occurs more frequently in boys than in girls, in the proportion of seventeen to ten.

Until within a few years knowledge in regard to the value of the operation for cleft palate as a remedy for the defect had remained at a standstill, and no improvement in the methods of doing the operation had been made.

The profession had come to look on the surgical success as so uncertain, and the physiological results had proved so unsatisfactory, that all surgical proceedings had become discredited, and, save for practice, had fallen into disuse.

Lately there has been a revival of interest in the operation, and a growing faith that practical results may be obtained. I have sought to aid the matter according to my ability, and by combining ways and means known with a little not before put on record I have developed a method for operating which in my practice produces very uniform surgical success, and generally all the practical physiological results that could be desired follow. It makes articulation of all the sounds possible, and perfect enunciation attainable by intelligent practice and attention.

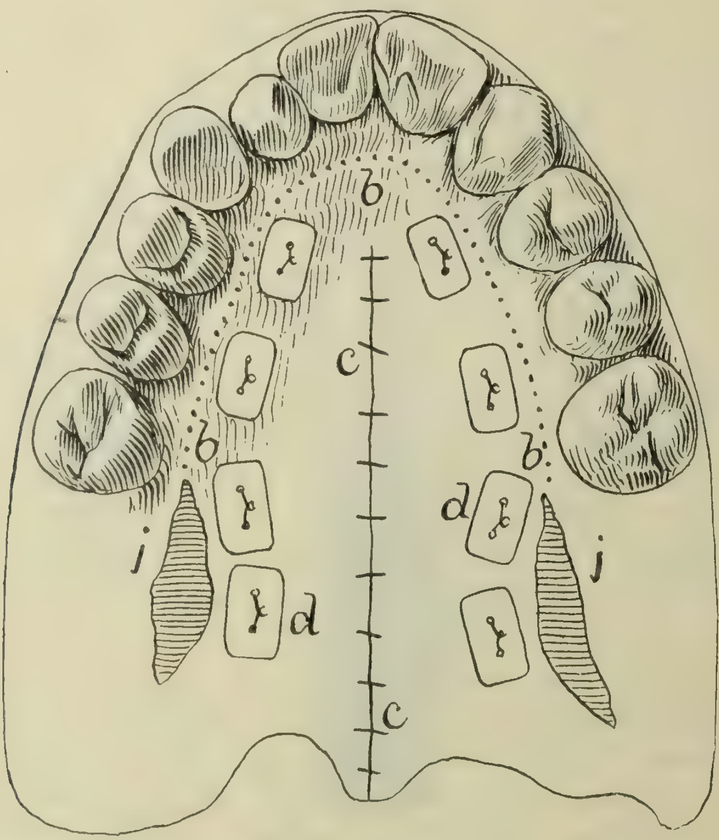
Fig. 1.



The accompanying figures make the plan clear. Fig. 1 shows the mouth of a patient, male, seventeen years old. The fissure *a, a, a* extended from the uvula to opposite the first bicuspids. Fig. 2 shows the operation as I have performed it. I commenced my incisions at the edge of the fissure, Fig. 1, and with a hoe-shaped periosteum knife dissected off the tissue from the hard palate to the dotted lines *b, b,* Fig. 2. After paring the edges of the flaps I inserted silver sutures running above the flaps and passed them through the palate and through pure silver disks *d,* Fig. 2, twisting the ends and making tension which fully approximated the edges. To fully relieve the strain upon the soft palate, and also to allow contraction of the arch, I made incisions *i*, Fig. 2, from the tuberosity down the side of the throat. In some cases I cut down to opposite the lower molar. I cut through the mucous membrane with a scalpel, and then separated the deeper tissues with a smooth dissector, in order to avoid injuring important vessels.

The edges of the cleft now held in close approximation, the mucous membranes were brought more accurately together by fine silk sutures, *c*, as shown in Fig. 2. I thus avoided the lateral incision in the hard palate, the cutting of the pillars of the fauces, and approximated the tonsils so as to lessen the arch and allow the soft palate to retract to a considerable extent.

Fig. 2.

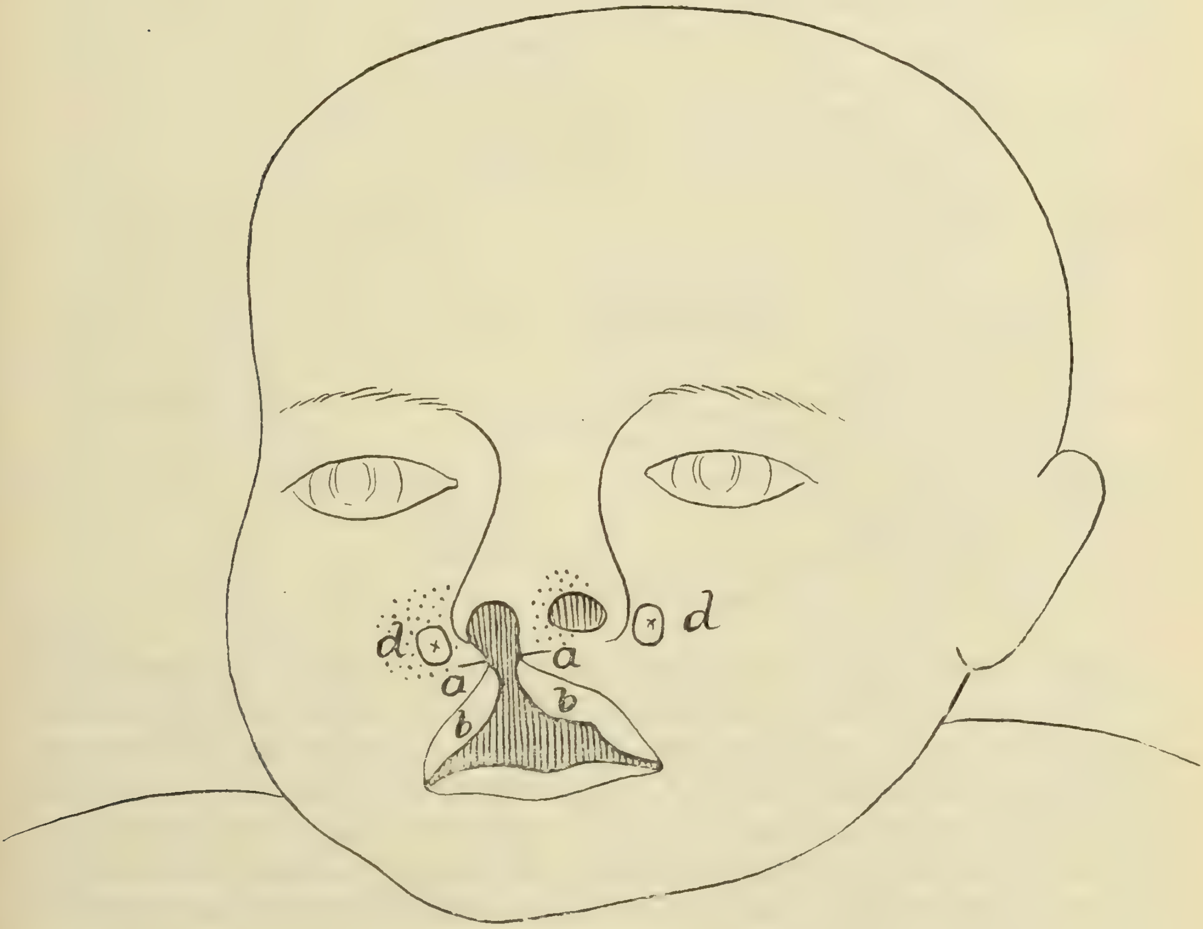


Should I find it necessary in any case to further widen the flaps at the junction of the hard and soft palates, I should make two or more button-hole incisions opposite the tuberosity. The button-holes will readily fill up by granulation. By this plan the extent of the incision is much reduced, the loss of blood lessened, and the nutrition of the parts preserved.

My apparatus for maintaining the anesthesia without interfering with the operation in the mouth I continue to use with great satisfaction. I described this in 1893 at the World's Columbian Congress. I have made considerable improvement in it since then. By its use no time is lost in waiting for anesthesia. It consists of a bellows, a wash-bottle containing ether, and a tube reaching to the mouth of the patient. Air is blown over the ether in the bottle, and becomes charged with the vapor and is discharged from a small tube into the mouth of the patient. I have adjusted a valve to the tubes entering the bottle by which the amount of air going over the ether is controlled, thus varying the strength of the anesthetic according to the needs of the patient.

Hare-lip is not so common as is cleft of the palate. A large proportion of clefts of the palate extend no farther forward than the cuspids, while the alveolus and lip are perfect. Such patients can much more easily acquire good speech. Good lip movement is as essential to perfect speech as is the palate, and when the lips are restricted by lack of substance or by cicatricial tissue, or fail by lack of use to perform their function, imperfect speech results.

FIG. 3.

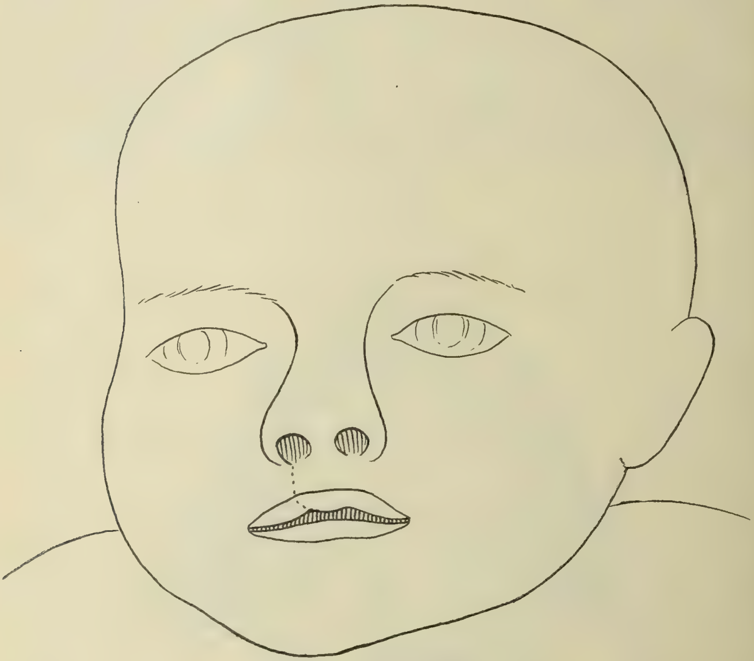


The accompanying figure shows a system of incision that I have adopted which produces the most gratifying results as to length and width of lip. It utilizes all of the red border and wastes none, whereas the older plans sacrifice a large portion of it and render the lip narrow, and consequently the motion restricted.

Fig. 3 shows the lip of a patient, male, nine weeks old, for whom I operated a few months since.

There was also a complete fissure of the palate one-half inch wide, which I closed two weeks before I did the lip. As the septum was directed to the left, I separated that freely, as shown by the dotted surface. I also passed the knife under the tissue on the right, freeing it from the bone nearly out to the infraorbital foramen. A wire passed through the tissue and through the disks *d, d,* and tightened, drew the parts into close apposition. This made the nostrils equal in size. I kept the right nostril packed for a few days to overcome the tendency to flatten, after which they remained symmetrical in all respects.

Fig. 4.



I pared the edges of the cleft down to the commencement of the red border, *b, b*. Then, to gain length to straighten the red border, I made the incisions *a, a,* at right angles to the edge of the commencement of the red border. I trimmed the upper sharp angle a little and then straightened out the lateral incisions, making a vertical one, and secured the parts with ligatures. The result was an upper lip as broad as the under, and of normal proportions, and left little further to be desired.

THE ETIOLOGY OF GNATHIC ABNORMALITIES.

BY ALTON H. THOMPSON, D.D.S., TOPEKA, KANSAS.

(Read before the National Dental Association, August 1, 1899.)

The degeneracy of the jaws of civilized man as compared with those of the apes, or even with the lower races of mankind, is one of the most conspicuous of the special features of his organization. The recession and reduction of the jaws seems to have kept pace in an inverse ratio with the development of the brain and the consequent enlargement of the brain-case. The facial skeleton is really embryonic in civilized man, for the jaws develop but little in the evolution of the individual from infancy to maturity, but remain at a stage that is attained in childhood. Observers have noted that there is a striking resemblance between the face and jaws of an infant ape and an infant man; but in the ape the jaws develop extensively as the individual grows to the adult form, while in man they remain at a stage that is more or less embryonic through adult life. That the jaws of civilized man are much reduced from their size and strength in the apes, and even the lower races of mankind, is a well-known fact that has been dwelt upon by many writers. Dr. Talbot made extensive observations to demonstrate that the really normal human jaw is growing gradually smaller. But the gradual and normal diminution of the jaws does not, according to Dr. Talbot, constitute degeneracy in its strictest sense, but that the word is applied to abnormalities in size and form. He says ("Degeneracy," p. 248), "When arrest of development so takes place that deformities of the dental arch result, the jaws vary much, and (253) in no part is degeneracy so evident as in the stigmata of the jaws. . . . The jaws as a whole, owing to an unstable and ill-balanced nervous system, are liable to become excessively developed as well as arrested in development." The jaw parts are the subject of various deformities, which are not to be ascribed to mere accident of either intra or extra uterine evolution. The causes must be sought for farther back in that nerve-trophism which presides over the nutritial supply, which is the prime source of physical and mental defects, abnormalities, and monstrosities. There is no doubt that some of the causes of simple contracted jaws and consequent irregularities of the teeth are prenatal, although much of dental irregularity is also due, of course, to inharmony of the jaws and teeth during the eruption of the latter.

If the causes and evolution of normal life are obscure, how much more obscure are the causes of abnormal organisms and parts. In our search for light let us begin at the beginning and note some of the facts in regard to the evolution of the facial parts in vertebrates: From the vertebral column proper two arches spring, comprising the axial skeleton. First the smaller is placed above the vertebral column, and is called the neural arch, because it incloses and protects the nervous system, the brain, and spinal cord. The second is the larger arch and lies below the vertebral column, and is called the visceral arch, because it incloses the viscera. The trunk and head of a vertebrate are composed of segments serially arranged, and these arches are correspondingly found in the head, the cranium being distinctly composed of vertebral arches; the comparative size of the arches being reversed, however, as in man. The bones of the brain-case therefore belong to the neural arches, and the facial skeleton to the visceral arches of the typical vertebrate. Professor Huxley says ("Anatomy of Vertebrates") "that the facial skeleton bears a distinct relation to the posterior visceral arches, and corresponds to the gill-arches of amphibians and fishes." Professor Flower says ("Osteology of the Mammalia"), "At a very early period in the lamina forming the side walls of the cervical region of the embryo certain thickenings appear, dipping downward. These are the visceral arches. Between them slit-like openings are found, which are called the visceral clefts. In the lower vertebrates some of these clefts remain open permanently, forming the branchial apertures of fishes and amphibians for breathing, the gills; but in the mammalia they speedily close, and, with the exception of the first, leave no trace of their existence." Or, as Professor Ernst Haeckel says ("Evolution of Man," Vol. I, p. 355), "In the embryo of man, as in that of all other vertebrates, the gill-arches and openings appear at a very early period on each side of the head. . . . The gill-arches are transformed finally into the jaws, partly into the hyoid bones and the bonelets of the ear. . . . (Vol. II, p. 224), The first of the gill-arches becomes the jaw skeleton of the mouth. A small process first grows out from the base of the first gill-arch. This is the upper jaw process, a plug-shaped formation extending up to the neural processes and uniting with them. The next gill-arch develops a cartilage on its inner side, called, after its discoverer, 'Meckel's cartilage,' on the outer surface of which the lower jaw is formed. The upper jaw process forms the principal part of the entire framework of the upper jaw. The middle portion of the upper jaw skeleton, the intermaxillary bone, develops from the anterior portion of the frontal process. The palate roof, separating the mouth from the nasal cavity, is formed by the coalescence of the two lateral portions of the horizontal plates of the upper jaw processes. When these do not adhere in the middle line there occurs an opening between the two cavities, cleft palate, as it is called. Hare-lip is a slighter degree of this arrest of development." Neck slits are also survivals of the gill-clefts.

Now, the causes giving rise to imperfect development and abnormalities of the jaws must be sought for in the conditions surrounding the evolution of the jaws from the gill-arches, for these defects are more or less of reversions to primitive and early embryonic types, as found yet in living low water-breathing vertebrates, in which the gill-arches remain permanently. The prevailing influence in impelling the further evolution of the parts is growth force, *Kinetogenesis,* as Professor Cope calls it ("Factors of Evolution," p. 246), the effects of use and disuse. He classifies growth force into "excess of growth energy, defect of growth energy, degeneracy from disuse, degeneracy from excess of growth elsewhere," etc. The energy of growth from use tends to the development of an organ or part in anticipation of its use. This leads to the full and typical evolution of the jaws in response to the energy of their employment. Degeneracy and decrease of the jaws, as of other parts, results from the decrease of growth energy through disuse. This is manifested, of course, in the trophism of the nerves which preside over the nutritial supply during growth. In Darwin's classic words ("Descent of Man," p. 12), "Disuse at that period of life when an organ is chiefly used (and this is generally during maturity) seems to have been the chief factor in causing organs to become rudimentary. . . . It causes a lessened flow of blood to the part, and thereby lessens normal and functional development.

Continued disuse thus weakens and diminishes any part of the organism."

The teeth and jaws, but especially the jaws, have suffered extensively through disuse, and are in the condition of being rudimentary. When very defective and imperfect they are primitive and embryonic. Such parts are, according to the laws of evolution, generally very variable, for, not being normal, they are not regulated by the sustaining influences of natural selection. When a part becomes useless another principle, economy of growth, comes into play to avoid any unnecessary expenditure of vital material in the construction of a useless part. This has been well described by Mr. Darwin. It seems to follow as a logical result that, the jaw parts having become in a degree useless in man, nature should naturally withdraw the nutritial supply and thereby render these parts rudimentary and incomplete. Economy or growth force would diminish the blood-supply, nerve-trophism would diminish nutrition, and deformities would result through the variability of so weak a part and vagaries of development follow.

Another law must be considered also as applying with great force in regard to the jaws, and that is the law of correlated variation, or growth, on which Mr. Darwin lays great stress. Indeed, he says in regard to its effects upon the growth of the jaws ("Descent of Man," p. 33), "From the correlation which existed (at least in some cases) between the development of the jaws and the limbs it is possible that in those classes which do not labor much with their hands and feet the jaws would be reduced in size from that cause. That they are generally smaller in refined and civilized people than in hard-working men and savages is certain." That this law must obtain among people of luxurious and indolent habits there seems little doubt, and that it does have an effect upon the development of the jaws there is little reason to question. Persons who use their muscles but little cannot reasonably expect to transmit strong osseous organization of the extremities to their children, and by correlated variation the jaws are prone to be affected sympathetically. How far this law operates we can only conjecture, but that its effects should accumulate from generation to generation in the classes which do no manual labor seems reasonably conclusive. Perhaps the practice of athletics by the wealthy classes will tend to counteract this tendency and produce and transmit a better muscular and osseous organization, with a corresponding good effect upon the jaws, through the law of correlation.

In contemplating these and other well-known laws it seems highly probable—indeed, it is the opinion of leading evolutionists—that the higher races of man are now undergoing a rapid evolution. Radical alterations of structure are in progress, due to the efforts of nature to adapt the species to the rapidly changing environments with which civilized man is surrounding himself. He is producing for himself a new environment, and he alters it so frequently that nature is obliged to make strenuous efforts to alter his organization to keep pace with the changes in order to his preservation. How far these changes can be carried and how rapidly they can be effected is a serious question affecting the future of the species. Some of these variations are necessarily self-limiting, and will eventuate in the extinction of some types that have become so modified in some directions as to render further change impossible. When such varieties meet impossible conditions of environment, extinction is the only result, as has been amply demonstrated by the extinction of whole groups of highly specialized animals in past geological ages. The efforts of nature have already produced a very heterogeneous mass of varieties of mankind. Among European races some of these changes have had a pronounced effect upon the jaws, and will probably eventually produce varieties with still more embryonic jaws and larger brain-cases. The increase of the latter, stimulated as the brain is by high mental exercise, must be at the expense of the jaws and facial skeleton, which are not subject to use and stimulation. There is an inverse reaction here, and degeneracy of the jaws is undoubtedly contributed to by what Professor Cope calls "degeneracy from complementary excess of growth elsewhere." The skull and jaws by this inverse growth in civilized man are a wonderful example of the effects of use and disuse, which proceed simultaneously, illustrating the complementary growth relations of the parts. Professor Cope says (*op. cit.*, p. 248), "The orthognathism of the higher races is accompanied by full frontal development and retardation of the post-embryonic growth of the face. But this change can be traced to use, increased brain-action enlarging that organ and expanding its osseous case, probably at the expense of lime-salts which would otherwise go to the jaws."

The jaws and face being therefore in this reduced condition through the effects of evolution, it is but a step to the production of deformities by the collapse of the nutritive powers through faulty nerve-trophism. These collapses of nutrition are the cause of asymmetry of the jaws and face, incomplete evolution of any of the parts producing distortions, and even the grosser growth defects, as cleft palate and hare-lip. In the latter we have an exhibition of the embryonic and primitive condition of the arches as found in early vertebrate aquatic life. As Dr. Harrison Allen once said (*Medical Times*, 1879), "Errors of development and growth force of the face often occur; not alone in the failure of the arches to unite, as in hare-lip and cleft palate, but processes not ending in gross defect, yet exercising just enough disturbing influence over the bones of the face to prevent success in shaping the oral and nasal cavities." Inasmuch as the normal face is the result of the perfect union of the lateral visceral half-arches joining the median structures projected from the front of the brain-case, it follows that if there is any want of harmony between the two genetic movements errors of symmetry and imperfections readily occur. An explanation may thus be given which reasonably accounts for the want of development of one or both halves of the dental arch. This maldevelopment is in the nature of a catastrophe, and beyond the effects due to growth suppression.

In regard to the growth defects of the upper face, it was said by Dr. Hubbard (DENTAL COSMOS, 1898, p. 270), "Some of the etiological factors have particular reference to the abnormal conditions also of the nose, naso-pharynx, and pharynx during the development of the jaws. These conditions exercise the most direct bearing in causing deformities of the upper and lower jaws." Their value may be estimated when we consider that ninety-five per cent. of skulls have deflection of the nasal septum. Dr. Harrison Allen said (*op. cit.*), "Many cases of dermoid cysts have been tabulated, the result, it is thought, of imperfect nutrition at certain points along the line of the visceral arches. Asymmetry of the nasal chambers, the external nose, and the two halves of the dental arch often occurs entirely apart from the acquired defects in the same locality."

The jaw parts of civilized man being reduced so as to make an almost perpendicular line of the face, orthognathism, as it is called, are in marked contrast to the prognathism or protrusion of the jaws of the lower anthropoids. The inverse relationship of the jaws and cranium which has been referred to has much to do with this, of course,—*i.e.*, as the brain-case advances the jaws recede, and as the jaws advance the brain-case recedes; the balance between the animal and intellectual natures being graphically represented in the faces of the highest man and the lowest ape. The embryonic condition of the lower face of the higher races places it just on the verge where the least disturbance of nutrition throws it over into the region of imperfection and deformities. The contracted forms of the arch which we so often see associated with high intellectual development tell the tale only too plainly. The brain has very evidently been evolved at the expense of the face. Gross defects due to failure of the gill-arches to unite in the median line are directly due to collapse of growth force at the period when the embryo had not yet passed the gill-arch stage. Such individuals are generally degenerates in the most complete cases. The collapse may be a matter of accident perhaps, and yet nature does all things in accordance with positive laws. The law in regard to gnathic abnormalities seems to be that of degraded nerve-trophism consequent upon the incomplete evolution of the gill-arches to form the face, due in its turn to disuse and the inevitable economy of growth which follows disuse. Nature is exact in her accounts and inexorable in her demands, and when a part becomes practically useless the nutritive supply is withdrawn and needless expenditure avoided. This law is of universal application throughout the human organism, and many other defects of structure and deformities could be accounted for in accordance with its workings.

"SHUT YOUR MOUTH."

BY A. M. WRIGHT, M.D.S., TROY, N. Y.

(Read at the Joint Meeting of the Third and Fourth District Dental Societies of the State of New York.)

SLANG? Yes, but I once heard an eminent divine say, "Slang properly used is often expressive of sentiment that could not be conveyed in as few words in any other manner." I will try to show you in a short paper that in many ways this slang phrase, "Shut your mouth," is very apropos to us as dentists.

It is evident from the account of the creation of man that the breath of life passed through the nostrils, and a deviation from nature, a mouth-breather, is an abnormality which is changing the breath of life into the breath of sickness, disease, and death. As we look at animal life we find that certain parts or organs are supplied with life-giving pabulum through certain vessels, but the vascular system is an intricate network; and if through accident or other causes the main channel of blood to a certain part is cut off, nature provides that to a diminished degree those parts will continue to receive a supply of blood through some of the smaller and less direct vessels, but this supply is not as perfect as through its original source. If through accident, sickness, or disease food cannot pass the œsophagus, nutriment to sustain life can be furnished by an enema. If through accident, disease, or congenital deformity the animal cannot breathe through the nostrils, it can supply oxygen necessary to sustain life through the mouth; but pabulum that has been sent out of its natural course to reach an organ or part, nutriment furnished through an enema, or oxygen furnished through the mouth, is not nature's method of supplying the loss of waste material or building up new.

Let us look at some of the earliest pernicious effects of mouth-breathing. I think I would place among the greatest dangers a diminished supply of air; that means blood poorly enriched with oxygen, a lessened lung capacity, round shoulders, an anemic. How is this brought about? In nasal breathing the air is thoroughly filtered; it is warmed before reaching the lungs; it receives a very perceptible amount of moisture. In mouth-breathing the passage for the air is shorter and more direct; the air enters the lungs without the slightest filtration, leaving a trail of dust throughout the bronchial tubes and filling the air-cells of the lungs with the same material; this is a three-fold danger. The coating of dust on the delicate tissue between the air-cells and the capillaries of the arterial system prevents a free interchange of the gases, oxygen and carbon dioxid; it also absorbs a certain amount of moisture from the lung tissue, which is necessary for perfect work; but, greater than all these, it is carrying direct to the lungs perhaps the bacillus tuberculosis that but a short time previously was dropped on the floor of a street car in the sputum of some careless consumptive person.

In an enfeebled condition, caused by the loss of oxygen, the greatest scavenger and best antiseptic known, you can easily see how the cold, dry atmosphere, heavily laden with dust and unknown germs coming in direct contact with the delicate tissues of the trachea and lungs, causes an irritation. Irritation means perhaps congestion, inflammation, disease, breaking down of lung tissue, blood poorly enriched with oxygen, lessened lung capacity, caving in of the chest-walls, rounding of the shoulders,—and God breathed the breath of life into his nostrils and he used his mouth.

There are still many adherents to the theory that the V-, or saddle-shaped mouth, is the direct result of mouth-breathing. Their theory is if the mouth is continually held open the buccinator muscle is forced against the teeth, causing a narrowing of the arch in the region of the bicuspids, forcing the anterior teeth forward and deepening the arch. Certainly, mouth-breathing and malformed arch often go hand in hand, and we as dentists should first notice the growing deformity.

This usually begins to develop about the seventh year, at a time when the first permanent teeth need attention. Now, what is the cause of this unnatural condition? Let us look. The little child has a nasal twang to its voice, and the mother informs you that the child has had a cold in its head for a number of weeks. In your examination for decayed teeth did you notice enlarged tonsils, which we find so often associated with mouth-breathing? Did you speak of it to the parent? If you found the tonsils in a normal condition, did you tell the parent that there was an unnatural condition somewhere that must be remedied? Did you say it might be caused by some congenital deformity, adenoid growths, or deflection of the septum? Did you point out the result of a continuation of the practice of mouth-breathing,—malformation of the maxillæ, typical V- or saddle-shaped arch, protrusion of the incisors, the so-called "dog-faced" appearance, the injury to the general health of the child, malocclusion of the teeth, the very much greater danger from infectious diseases? That this trouble is susceptible to cure, and should be immediately placed in the hands of a specialist? Did you, can you, imagine a "dog-faced" mouth-breather with a living soul? Yes, I can, but often think they feel life is not worth living.

We fully realize that we cannot exist without atmosphere, yet through it many germs of sickness and disease enter the body. Keeping the mouth shut prevents many disease-producing germs from reaching a point where they can develop. By breathing through the nostrils the olfactory nerves warn us of many dangerous gases or places we should avoid. There are other reasons why we should keep the mouth shut. "Silence is golden," said the poet. Some clocks only indicate their worth when you look at their faces; they are not continually sounding their own praises. A dental office should not remind one of a barber shop, where the operator is wound up every morning and expected to run twenty-four hours; it is not the place to learn all the latest town gossip. There *is* a great amount of good, solid, sound, practical information that can be imparted to the patient in the chair, but in doing so use care that the impression is not given that you are striking your own clock.

You often hear the question at a convention, "How can we educate the public to give their mouths and teeth the proper hygienic care?" I think that at the chair is a good place. Here the mother gains perhaps her first knowledge of the temporary and permanent teeth; of the value of retaining the temporary teeth until they have fulfilled their entire function. Yes, a hundred other little points of value to her in raising a family of little ones. Don't say too much; just enough to make a lasting impression. You will often remember with delight a ten-minute talk, but a half-hour sermon makes you tired.

> "Man must be taught as though you taught him not,
> And things unknown proposed as things forgot."

The true teachers will use language that is familiar, and if you are trying to instruct your patient ever bear that in mind.

Just to make a change in the every-day life of a dentist I visit an office in another district (in spirit), and while waiting a little miss walks in. "Dr. Talker, I wish you would look at my teeth. Dr. Mallet has always attended to my work, but he is so cross and hurts so that I have left him." Oh, if in this trying hour you could only keep your mouth shut you might congratulate yourself before many days pass by; but no, you examine the mouth and find caries, gold, amalgam, and rubber fillings, and it takes but a few moments for you to impress on the mind of that young lady that gold is the only filling to use, and with your never-hurt-um apparatus she can have all the soft fillings removed and gold inserted; all this should be done immediately. "Dr. Mallet knew that rubber was not permanent, and that amalgam turned dark, and had no business to use it in your mouth, etc., and I'll guarantee my work to last you all right." Ding dong strikes your clock, just as it has done in your office for years past. The appointed hour arrives. After much hard work and silent prayer on your part the rubber-dam is adjusted; you turn from your patient to your cabinet, and you find a rope of saliva connecting each finger with the little girl's mouth. You turn again to your patient and find she has been trying to use the spittoon, and in some unaccountable manner has filled your dam with this thick, ropy semi-fluid, and stringers are hanging from her mouth in all directions; and long before you finish your morning work you are wishing you had kept your mouth shut. My friend, did you forget that man should breathe through his nostrils? He cannot do that and talk about his neighbors.

If you had kept your mouth shut you would not be in your present trouble. The little lady will stand no pain; you cannot keep her in any position two consecutive seconds; your never-hurt-um does but little good; tears roll down her cheeks; saliva defies dam and siphon; life becomes a burden. After a morning of hard work your patient goes home with a few gold fillings, none of which satisfy you; and you know that there are other mornings of the same kind to follow, for you have told her that the rubber should all be taken out and replaced by gold. I hope I hear you make this mental resolve, that in the future I will keep my mouth shut when I see work done by my neighbor dentist, at least until I find if I could have done better.

It is said that there is a gift beyond the reach of art; it is that of being eloquently silent. A dentist that does not know how to keep his mouth shut when a patient speaks of other dentists has not a living soul in his body; he is narrow-minded, like a small-necked bottle, which may be nearly empty yet make a great noise in pouring that little out. I am well aware that the man just beginning the practice of dentistry knows all that is worth knowing. I passed through that experience myself, but time has taught that under certain conditions gutta-percha is the filling-material par excellence. How often we will notice after a few years of practice gray hairs and horse sense hitched together making a fine team.

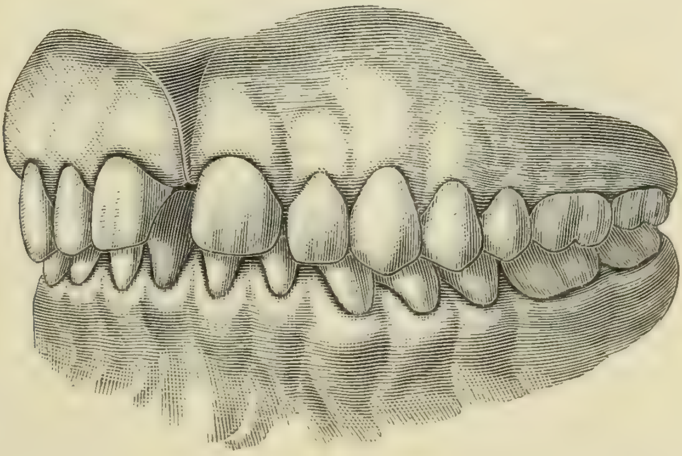
If you visit your attorney and he spends time for which you are paying him in abusing his brother attorney, you soon tire of it and make a change. Take these thoughts to your chair, and see if an open mouth has gained or lost for you the confidence of your patient.

ORTHODONTIA. SECTION OF PERIDENTAL MEMBRANE AND FRENUM LABII.

BY EDWARD H. ANGLE, M.D., D.D.S., ST. LOUIS, MO.

A FORM of malocclusion characterized by a space between the upper central incisors (and rarely between the lower centrals) is quite frequently met with (Fig. 1).

FIG. 1.

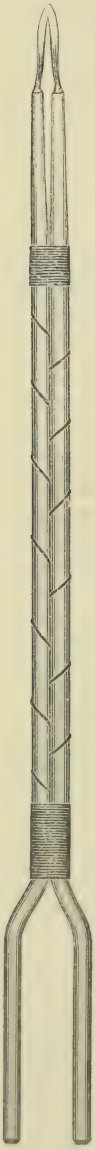


The space may vary from one to four, or even five, millimeters, and always attracts unfavorable notice, and interferes with speech in proportion to its width.

The closing of this space by drawing together the incisors is a comparatively simple operation, requiring only a few hours, or days, at most. But, notwithstanding the ease with which these spaces may be closed, they are yet well known to be unsatisfactory and annoying cases to treat, on account of the difficulty of permanently establishing the teeth in their corrected positions, for it is most often found, after even months of the most perfect support by the retaining devices, that following their removal the teeth will rapidly separate and assume their former positions. By a more careful study of these cases the reason for this becomes obvious,—the cause has not been removed.

If a large number of these cases be examined it will be found that in nearly every instance there is an *abnormal attachment of the frenum labii,* which, instead of being thin and ending about five millimeters from the gingiva, is found to be thickened in proportion to the space, and continues in its attachment not only to the gingiva, but passes directly through between the central incisors and is attached to the mesio-lingual tuft, which is found to be correspondingly enlarged.

FIG. 2.



This strong ligamentous cord, passing as it does between the teeth, not only prevents the space from closing by its passive presence, but exerts an active mechanical influence as well, each movement of the lip exerting a lateral tension upon the cord, which tends to separate the teeth still farther. This may be easily demonstrated by grasping the lip between the thumb and finger and exerting tension upon the ligament to the right or left.

Whether this abnormal condition of the frenum is the result of an abnormal suture in the bone is not clear, yet it is probable that it is nearly always an accompaniment, although I have seen some cases where the condition of the bone seemed to be normal. A more exact knowledge gained through the use of the X rays in a satisfactory number of these cases is much needed.

Treatment.—It is evident that the portion of the ligament passing between the teeth must be removed, or so modified as to no longer act mechanically upon the teeth.

I have derived partial success by the mere severing of this ligature with a pair of delicate scissors, union of the ends while healing being prevented by occasional manipulation; but the plan which I now make use of, and which offers promising results, is to take advantage of the contraction of tissue resulting from actual cautery, the same as rhinologists do in operations upon the nose for deflected septum.

A deep incision with a cautery knife, Fig. 2, at white heat is made between the teeth, splitting the cord, which should be preceded by a suitable lancet or bistoury, in order to better control the direction of the cautery instrument.

Before making the incision the tissue should, of course, be locally anesthetized with the proper solution of cocain applied by means of a pledget of cotton, for about ten minutes, after which no pain will be experienced from the application of the cautery instrument. Great care should be exercised in the use of the cautery instrument, operating only upon the abnormal tissue and rigidly *avoiding wounding the peridental membrane.* It is for this reason a clean incision with a bistoury should precede the cautery.

The teeth should then be drawn together and mechanically supported for several weeks or months. My favorite method of closing the space is to exert pressure by means of a wire ligature, occasionally tightened by twisting or renewal, which is made to encircle two spurs, one-thirty-second of an inch long, soldered to the mesio-labial angles of accurately-fitting bands cemented upon the teeth to be moved, Fig. 3.

It is desirable to have the bands (of German silver) made and cemented upon the teeth before the operation, as of course it can then be more easily done than afterward.

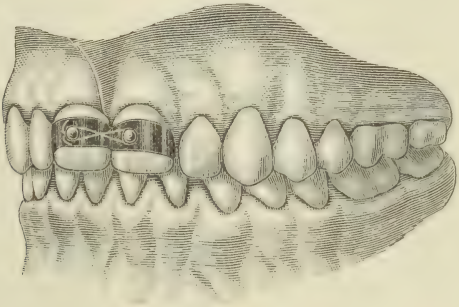
It is important that the ligature be long enough (at least fifteen inches) to grasp firmly with the hands and exert strong pressure while making the twist, which should never be more than three-fourths of a circle at first, as more would be unnecessary, unsightly, and of needless bulk. After the twist the surplus ends are cut off, still leaving a projection of about one-eighth of an inch, which should be curled under.

By far the most suitable ligature is a fine quality of brass wire, No. 26, annealed in its manufacture.

This same device for retention is very satisfactory, or the bands may be removed and replaced by similar bands joined together by solder (Guilford).

Another plan of retention, though less perfect, possesses the advantage of being inconspicuous, and may be employed in all such cases with advantage during the closing period of retention (or after the patient has become tired of wearing bands). It consists of a delicate vulcanized plate covering all of the anterior half of the vault of the arch, into which have been vulcanized two delicate fingers of German silver, which shall bear against the distal surfaces of the centrals and prevent their separation. This may be worn at night only at first, and gradually dispensed with; but should be continued as long as there is any tendency of the teeth to separate. When we consider the character and structure of the peridental membrane, the necessity of support for a considerable length of time (a year and a half in some cases) should occasion no surprise.

FIG. 3.



SURGERY OF THE PERIDENTAL MEMBRANE.

There is another minor surgical operation which may be employed with much advantage in order to expedite tooth-movement in regulating, as well as to shorten the period of retention.

If the reader will study the peridental membrane, Figs. 4,* 5,* and 6,* he will find that the fibers in their arrangement and attachments are most ideal for resisting displacement of the teeth in all directions during mastication. In the direction that greatest force is brought to bear upon the teeth there do we find the bundles of fibers of strong, inelastic tissue most plentiful and most effectively arranged to combat this force and to hold the teeth firmly in position, as, for example, the greatest number of fibers serve to suspend the teeth in their sockets, or to resist the direct antagonism of the opposing teeth.

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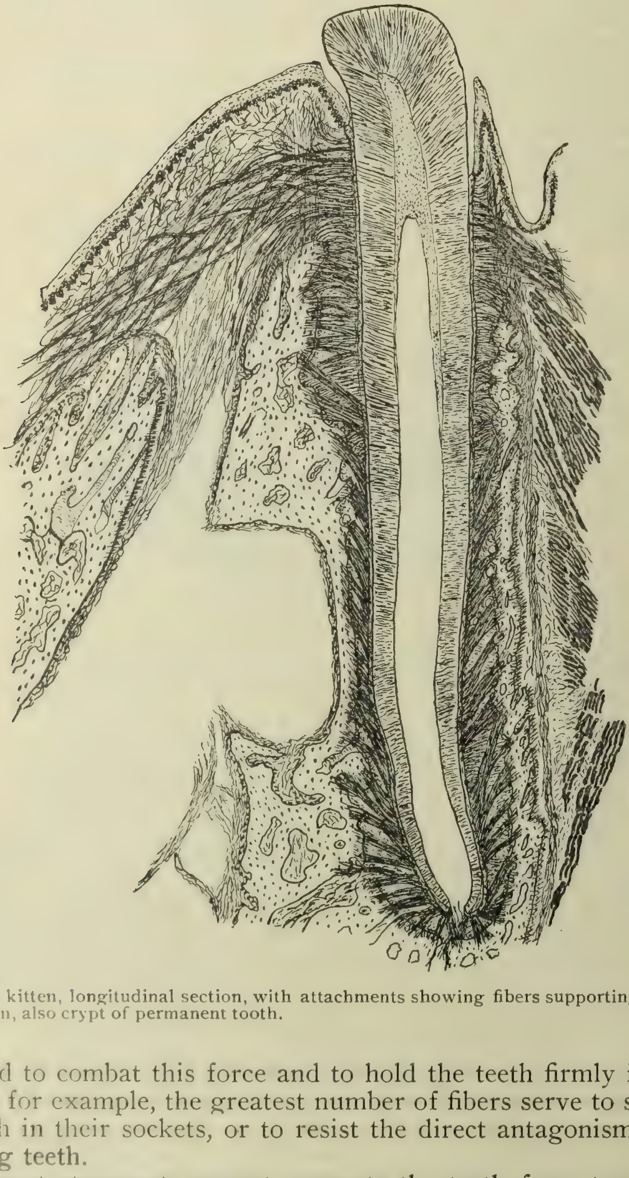
*Prepared for the author by Prof. F. B. Noyes.

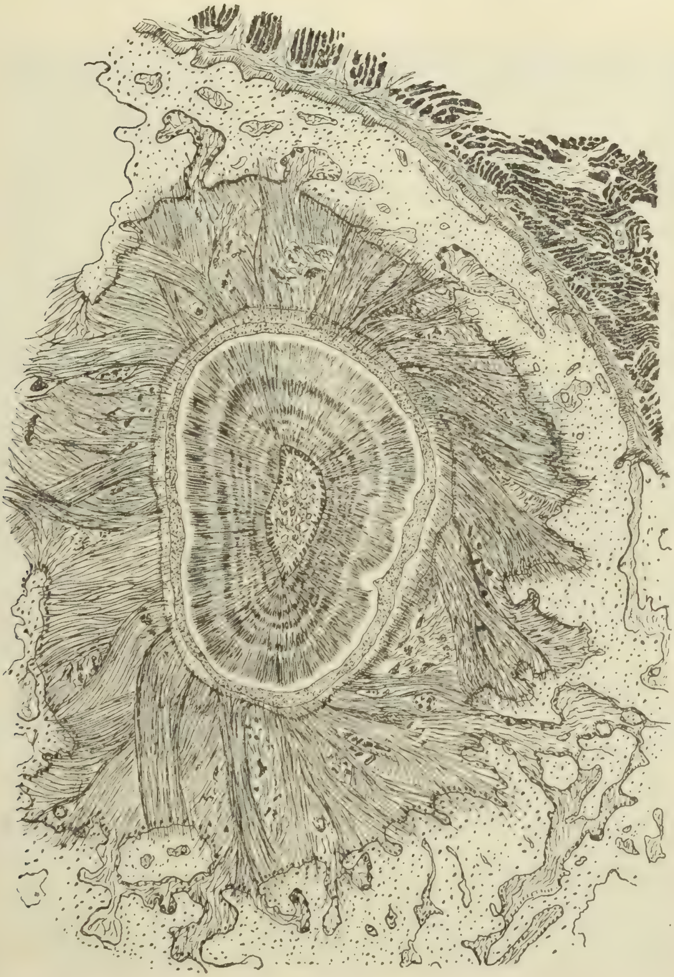
FIG. 4.



Tooth of kitten, longitudinal section, with attachments showing fibers supporting the force of occlusion, also crypt of permanent tooth.

The next strongest support prevents the teeth from turning in their sockets. This is due directly to the arrangement of those fibers which radiate at a tangent from the four angles of the root, as in E, Fig. 6, as well as indirectly to those which radiate at right angles from the sides of the root. This arrangement fully explains why rotation is so difficult a tooth-movement to accomplish in regulating.

Fig. 5.

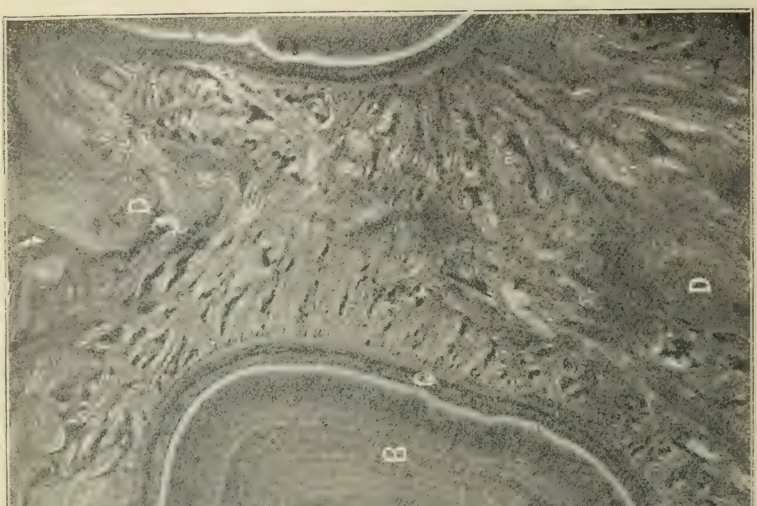


Transverse section in alveolar portion, showing thickness of labial plate, muscles, periosteum, and fibers of peridental membrane resisting rotation.

The next strongest support is from the fibers preventing lingual and labial displacement; next mesial and distal, and finally a comparatively few fibers distributed over the apices of the roots directly prevent the teeth from lengthening.

Now, in correcting the malpositions of the teeth by means of the regulating appliances it will be seen that an immense number of these fibers must be severed by the slow process of absorption. This being unavoidable, it occurred to me that it would be a most natural and desirable operation to *surgically* sever these fibers by means of a suitable knife, which I have successfully done in a number of cases, and thus greatly shortened the time of treatment, as well as lessened the inconvenience to the patient.

Fig. 6.

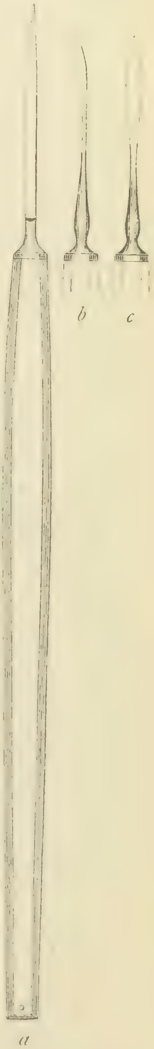


The same, as shown by the microscope.

Of course it is impracticable to operate upon the suspensory fibers, and probably on any of the fibers other than those in the first third of the root; yet it must be remembered that in these fibers there is the greatest disturbance, for this portion of the root is moved farthest.

If the movement of rotation is to be accomplished, the fibers should be severed at the two diagonally opposite angles of the root, when it will be found that the tooth will be turned more quickly and easily; or if a tooth is to be moved distally, for example the retraction of a cuspid into the space from which a first bicuspid has been extracted, the severing of the fibers on the mesial surface of the root will be found of advantage; or if it is desirable to have the lateral incisor accompany the cuspid, the fibers on the mesial surface of the root of the lateral only should be severed.

Fig. 7.



Again, if the lingual movement of a tooth is desirable, a portion of the fibers on the mesial and distal surfaces should be severed, but not on the labial surface, as the labial plate of the alveolus is so thin that it offers little resistance to the movement inward, and it is desirable that it shall be dragged with the root, while on the lingual surface a crescent-shaped portion of *bone* may with advantage be removed, as advocated by Dr. Bryan, of Basel, Switzerland, in an article read before the American Dental Society of Europe in 1892.

Another advantage to be gained from the severing of the fibers is that the tooth is moved bodily, or more nearly so, and with less tipping than when moved in the usual way. When moved in the usual way the apical third of the root moves in the opposite direction from the crown, and consequently gives more of an unnatural inclination to the tooth when movement is complete.

In performing this operation it is needless to say it should be done with caution, judgment, and skill, with thoroughly cleansed and aseptic instruments of the most delicate and suitable pattern. I know of no form of dental instrument well suited for the purpose. I have endeavored to modify our finest straight scaler to meet the requirements, but with indifferent success.

Dr. Lukens has suggested to me the delicate iris and cataract knives used by oculists, and they are nearly ideal for the purpose. The three forms shown at Fig. 7 are most desirable, the knife *a* being my favorite; while *c*, being double-edged, is also very suitable. These instruments are so extremely delicate that they may readily be passed between the tooth and alveolus, severing only such fibers as we wish, and that, too, with so little pain that a local anesthetic is unnecessary.

CORRESPONDENCE.

REPLY TO DR. WEDELSTAEDT.

TO THE EDITOR OF THE DENTAL COSMOS:

Sir,—On page 1043, October, 1899, DENTAL COSMOS, Dr. Wedelstaedt says, "'I have arrived at some definite conclusions which I recently communicated to Drs. Black and Johnson, and when published you can have them. I desire to obtain credit for the results of my researches.' Dr. Leonard said, 'I am as honorable as Dr. Black or Dr. Johnson, and I give you my word of honor, if you communicate the results of your work to me I will merely use them in my own practice; and I promise you I will not publish them.' After talking awhile with him, the two-thirds rule for the preparation of approximal cavities was communicated by me to Dr. Leonard."

I, Laurence Leonard, in answer will say, to those who know me, I simply refer them to my past record; to others I will say that *each and every word of the above quotation is positively untrue and false.* I shall further state that about December 10, 1897, while at luncheon with Dr. Wedelstaedt in Scheben's oyster house, St. Paul, Minn., we were conversing about our researches, and particularly about my trip to the coast and the essay which I read before the Pacific Coast Dental Congress, July 14, 1897. I asked him, "What would you think if I had arrived at the two-thirds rule, same as you have, as given in the December DENTAL COSMOS?" He answered, "Nothing; quite possible; quite possible." I said, "Well, doctor, I have, and to me it is another illustration of when facts are arrived at the results correspond, as did some of the researches of Drs. Williams and Black, which, discovered simultaneously, correspond exactly." As we parted at corner of Sixth and Minnesota streets I gave him the number (October, 1897) of the *Stomatological Gazette* in which my essay appears, requesting him to look it over and write me what he thought of it. As requested, he returned the number and wrote me, asking some questions as to the kind of instruments I used in measuring, etc., but never intimated, either by word when I met him in St. Paul, or later by letter, that I had betrayed any trust or wronged him in any way, which I again aver I certainly have not.

LAURENCE LEONARD.

WASECA, MINN., October 14, 1899.

COCAIN AND EUCAIN SOLUTIONS.

TO THE EDITOR OF THE DENTAL COSMOS:

Sir,—Through some mistake, for which I can scarcely account, the proportions of grains in connection with my paper on cocain and eucain are very incorrectly stated. Where it states that twenty minims of a two per cent. solution were used, which amount represents three-twentieths of one grain, the proportion of a grain should be eight-twentieths, or two-fifths. Where nine-fortieths of one grain is mentioned the amount should be three-fifths of one grain. Where six-twentieths of one grain is mentioned the amount should be four-fifths of one grain, and where a third injection of twenty minims was made the amount should be one and one-fifth grains.

If you will print this correction in the next issue of the DENTAL COSMOS I will be very grateful. A. H. PECK.

CHICAGO, October 16, 1899.

CORRECTION.

TO THE EDITOR OF THE DENTAL COSMOS:

Sir,—On page 767 of the DENTAL COSMOS for August last the compositor made the mistake to substitute the English word *inch* for the Greek letter μ, which in bacteriology denotes $\frac{1}{1000}$ millimeter (= one micro-millimeter).

Four inches and *three-quarter inch* should respectively read *four* μ and *three to four* μ. T. SÖDERBERG.

SYDNEY, September, 1899.

PROCEEDINGS OF SOCIETIES.

DENTAL SOCIETY OF THE STATE OF NEW YORK.

(Concluded from page 666.)

DR. L. D. SHEPARD, of Boston, Mass., read a paper entitled "The Dentist's Posture," which will be found at page 1100 of the current number.

Discussion.

Dr. OTTOLENGUI. We have listened to an exceedingly unique paper; one which begins by asserting that the writer has noticed continued progress in the dental profession, and yet in the middle portion he resurrects and reads to us a paper twenty-seven years old, which is just as new to us as though it had never been written, and which is just as pertinent to-day as it was then. Certainly there seems to have been little, if any, progress along those lines. Ordinarily I should object to the resurrection of dead and forgotten lore, but when the resurrectionist stands before us such a specimen of physical manhood, and such an exemplar of the paper read twenty-seven years ago, it may well be worth our efforts to follow his example. If I had the same kind of back, I would have it photographed myself. I am in the unfortunate condition of having to confess (although I did not read the paper when it was written, being seven years before I commenced to practice dentistry) that I have always sat and have always used a dental mirror, and yet I have not a back worth photographing. Perhaps I have not the right kind of stool, and perhaps I have not used the mouth-mirror often enough. It seems to me, from the pictures, my position at the chair is much the same; the body very frequently behind the chair, rather than at the side. While on the subject of position, I may as well mention a fact which I have only recently discovered myself. I have suffered a great deal with my back, but I am recently suffering very much less, and I attribute it largely to the fact that I am using an electric instead of a foot engine. If you will consider the position of the foot engine, with the treadle at the side of the chair, necessitating that the body be in such a position that one foot shall point toward it and the head face the chair, you will see that there must be a twist somewhere, and that is probably in the spine, causing the pain from which so many of us suffer. With an electric engine, which does not require that the foot shall be in constant contact with it, we can face in any direction we please and keep the body untwisted. The essayist read excerpts from my last book to prove how little I had to say about the mirror, but while I have not specifically described it, I have stated that it should be used in filling as well as in mere examinations of the mouth. In regard to this mallet, which I have seen for the first time, it seems to me it is an exceedingly ingenious method of producing the blow of the hand mallet. That is the great claim that is made for it, consequently the hand mallet itself ought to be just as good. The objection would be, from Dr. Shepard's standpoint, that you cannot use it while holding the mouth-mirror with one hand. In some cases I have been using a mouth-mirror attached to a clamp in the mouth, and connected with the clamp by a piece of lead wire. It can be used in many cases, leaving both hands free.

I am not going to enter into any extended argument or discussion on the paper, because I have approved all except one portion; and I may just as well show that dogmatism which has been commented upon, and state that to my mind the spit-cup shown in the picture might well be thrown away with the stage coach. I cannot imagine anything more objectionable than to have the patient spit into a cup into which he has already expectorated, and the idea of having it cleansed between each necessity for use seems hardly feasible. So far as the attack on the fountain spittoon is concerned, the author saves himself by saying that he objects to the spittoon which is connected with the sewer. Later on he says the spittoon cannot be constructed so as to be cleanly, which is an evidence to my mind that he did not conceive at the time that the fountain spittoon need not be connected with the sewer. In my office the fountain spittoon is evacuated by a pipe which leads into the cellar without the intervention of traps for the lodgment of anything excreted from the mouth, and empties into a second vessel which leads into the sewer, there being about two feet of space between the pipe and the iron basin which receives it. With one of the modern spittoons which has water constantly running into it, and the frequent use of antiseptics emptied into the bowl, I believe any babies that Dr. Shepard might have could live in my office without danger from sewer gas. I hope we may all have as erect a figure and as stiff a backbone as Dr. Shepard, and be able twenty-seven years from now to resurrect as good a paper as Dr. Shepard has given us.

Dr. HOFHEINZ. I wish to say to Dr. Shepard that I bought, about twelve years ago, the original mallet of Dr. Swartley from his widow at Chicago. It was gold-plated at the time, and was used as long as the doctor had it in his possession. I gave it to Dr. Snow for his collection in Buffalo. There is nothing more important, from a physical standpoint, than the posture of the operator, and it is certainly amusing to see some of them contort their entire anatomy to put in an ordinary filling in a bicuspid or molar. I believe a great many fillings put in mouths show imperfect results owing to the fact that the operator has worn out before his filling was completed. A great many start an operation with the thorough knowledge of all requirements for a good piece of work, and yet before the work is completed they have simply lost the physical resources necessary for such lengthy and tedious work.

Regarding the stool that Dr. Shepard speaks of, I think perhaps he is wrong in one respect. He said that but very few have followed the advice he gave in 1872. I must confess that in the circles in which I am acquainted the better class of operators are almost invariably using it. Seventeen years ago I started to use it myself. Whenever you ask a man who has not given a fair trial to the stool about it he will say he cannot do as good work with it. The proper use of an operating stool requires some time, and it is quite an art to do the work with the amount of ease that Dr. Shepard speaks of and which others have acquired. For those gentlemen who are operating at the chair from four to seven hours a day the paper of Dr. Shepard must be quite a benefit, because those men wear out very fast; and for any help they can get from such suggestions they ought to be grateful.

Dr. Low. If I should strip myself I might show as well developed a back, with regard to muscle, as Dr. Shepard's. The electric engine I use has its rheostat immovable under the chair, and start and stop attachment on each side of the chair. I sit a great deal. I would not want to use the mouth-mirror I sometimes see on the trays of my *confrères*. The mistake is in not throwing them away often enough. I have a movable glass, and that glass I throw away every few weeks and put in a new one. We ought to preserve our strength and our eyes. By the use of mirrors which can be thrown away quite frequently the eyes are relieved of much unnecessary strain. I use the jeweler's eye-glass very frequently, and I never saw anything mentioned about it until recently, in the *Items of Interest*.

I think if you gentlemen would use the ordinary jeweler's glass to inspect what you are doing as you go along, it would result in good. While I was waiting for my package at a jeweler's one day, it struck me that if that man did all his repairs with that glass it ought to prove useful to me. I asked him if it wore out that eye faster than the other, and he said "No." Oculists say it makes that eye stronger, but they cautioned me to close the other eye when using it. I believe the eye and the backbone can be rested more by the use of the mouth-mirror and the eye-glass than by any other adjuncts to the operating table, for the reason that their combined employment does away with the otherwise necessary craning of one's neck.

Dr. STAINTON. I think Dr. Shepard is himself the best commendation of the method he employs. I heard this paper in 1872, and remember with gratitude the care he took to explain to a young fellow the details of it. I went home and used the mouth-mirror four times as much as I did before. I still stand up, however, and manage to keep a pretty good back.

Dr. LeRoy. Another adjunct which the gentleman did not refer to, although it seemed his intention to incorporate all, is the back-rest which has been used in dental practice for many years; that manufactured by The S. S. White Company. I use the Lyon stool a good part during operations, but find the back-rest a great assistant. There are certain parts of some operations in which I could not sit down, and at times there is some distortion of the back, the strain being mainly on the lumbar muscles. Not having arrived at that point where I can use the mouth-mirror all the time, this back-rest takes a great part of the strain from me. Those of you who stand a great deal, and who are averse to the stool, might try it. It is adjustable to many angles by a screw, and by turning it to the side of the chair also acts as a pad to keep one away from the patient when obliged to throw the left arm around the patient's head.

Dr. W. H. Johnston. The thing I have been made acquainted with indirectly by the reading of this paper is the fact that probably most dentists do not use the mouth-mirror as described by Dr. Shepard. I do not know when or where I came to use it in all cases, but as far back as I can remember I have used it in every case and in all cases, using the reflection in cases of the upper jaw, and refracting the light into the cavity if the cavity is in the lower jaw. I have never used a stool for sitting, and have never known a back-ache, and yet I stand at the chair from six to eight hours for six days in the week. I still use the old-fashioned suspension engine, which allows me to stand upon my right foot and use the engine with my left. In that condition I can stand erect, and I do so. There is very little trouble with the contortion of the body under those conditions. The ability to work with the reflection of the mouth-mirror is a most desirable thing for operators, especially if they still insist upon standing. I have not refused to take the chair because I felt I could not use it, but because I did not feel the necessity for it. Using as I do the engine with my left foot, and standing erect as possible under all circumstances, I find that even at the close of the day's work I am not tired and my back does not ache. It has been something of a revelation to me that there is any question of the usefulness of the mouth-mirror at all times. It is almost an absolute necessity if we would be comfortable while operating at the chair.

Dr. Jarvie. Perhaps one of the first statements Dr. Shepard made in his paper was as interesting as any that followed. He told us that eight years previous to the time he wrote this paper (and he wrote it twenty-seven years ago) he had become so utterly fatigued as to be almost obliged to give up dentistry. He was a worn-out man thirty-five years ago, and while he was reading I thought that, although he may have the age of a Methuselah, he had the appearance of a young man. His reference to the use of the mouth-mirror was exceedingly interesting to me, because I took up its use many years ago from seeing an operator at a clinic use it for an entirely different purpose, and it occurred to me if I could accustom myself to operate by watching the reflection in the mirror of the surface being worked upon, that both patient and myself could assume a much more comfortable position than otherwise would be possible, and thus an otherwise fatiguing operation might be made quite easy. I found very much difficulty at first, because my instrument would insist upon going in just the opposite direction from which I wanted it; but a little perseverance overcame that. During a large proportion of my operations I hold the mirror in my left hand. Sometimes I use it to throw the light upon the surface upon which I am working. I cannot understand how any one can do his best work with the most comfort to himself and his patient without the constant use of this appliance.

About twenty years ago I procured one of the Lyon stools. At that time I used to get pretty tired by afternoon, and I received a great deal of ease and comfort from its use. I rarely used it but in the afternoon, and I gradually needed its assistance less and less, until about fourteen years ago I discarded it altogether. At the end of a week's hard work I get somewhat tired, but ordinarily I do not get as tired as I did twenty years ago. The physical condition of the different men varies very much. Dr. Johnston works all day long without a stool and never has a backache, while some other gentlemen cannot operate at all without its assistance; so what is a necessity to one man may be a nuisance to another. Because Dr. Shepard derives so much benefit from it and could not get along without it, we must not argue that Dr. Johnston requires it.

I feel very much as Dr. Ottolengui does in regard to the spit-bowl. I think it is simply vile to have that large cup to spit into. It cannot always be removed or cleansed every minute or two, and to have it beside the patient is not nearly as nice as the fountain spittoon, with its constant flow of water. The moment anything is expectorated into that it is instantly washed out of sight. As far as esthetic surroundings are concerned, the fountain spittoon is infinitely superior. Dr. Shepard may think differently, and he is just as much entitled to his opinion as I am to mine. The paper is an interesting one, and it is a very interesting fact to have a paper exhumed after twenty-seven years and listen to details uttered at that time in the light of our present experience and knowledge.

Dr. SHEPARD. The most serviceable mirror should be firm, stiff, and strong. I have used for many years mirrors made by Ash & Sons, which allow the glasses to be replaced easily when they are used up. A glass lasts one day, one week, or one month, according to the care with which one keeps the bur from scratching it. The moment one scratch, no matter how small, is on the mirror it is valueless to me. The mirror frame, which is split, screws into the handle, so that it is easy to replace a glass. The chief objection to such a contrivance is that there are cracks and crevices. I have overcome to a great extent this objection by filling the spaces with Balsamo del Deserto. I have also used a wax strongly impregnated with thymol, so that only the extreme edges can be a receptacle for bacteria. I think that by antiseptic washing and heating they can be kept practically aseptic. I do not like a mirror frame which has milled edges, which are apt to rub on the teeth like a file.

I have several of the spit-cups, and it is a fact, in my experience, that a patient sitting comfortably in the chair will take up the cup and put it back with greater convenience than to lean over to reach the fixed receptacle beside the chair. Dr. Sylvester, of Berlin, has a similar salver with a cup upon it, and the assistant takes it away when necessary and brings a clean one; and I may say esthetic patients like it.

Dr. A. Retter, of Utica, read a paper entitled "Restoring Badly Broken-Down Molars and Bicuspids to Usefulness," which was printed in the September issue of the Dental Cosmos, page 857.

Discussion.

Dr. Barnes. I do not feel competent to discuss the paper, because I have not tried the method described. The essayist has confined himself to the consideration of one class of teeth, cavities in badly broken-down bicuspids and molars. Would it not be better to fit a gold crown on those teeth, even if we must build up the wall with amalgam in order to get a good fit? He has compared this work principally with poor crown- and bridge-work, and his work seems ideal compared with that class of work; but he should compare it with good and well-fitting gold crowns. Some gums will not tolerate a gold band under them, and in these mouths the gums will recede. In other mouths, with poorly-fitting bands, the gums seem to do nicely. The essayist asserts that he never removed a crown that did not smell foul. I have removed cement fillings that were very foul, and I have removed some crowns that had no unpleasant odor at all. These were perfect-fitting crowns. In other cases the cement certainly did smell very foul, especially when heated.

Cleaning the canals first, sterilizing thoroughly, and then filling perfectly; that is all there is of it when it comes to the filling of root-canals. How do we know in excavating any tooth when we have removed all the infected and carious dentin? Dr. Allen, a noted surgeon, said, "Some time ago dentists removed all the decay in teeth without knowing why they did it, the same as surgeons curetted an abscess. They then sterilized the cavity with carbolic acid, and replaced the destroyed tissue with something that is aseptic and that remains so." We cannot tell in excavating a tooth always by the color or texture when we have removed all carious dentin. Whether we should always sterilize, and how much we should sterilize, a prepared cavity is a question on which I would like to be enlightened. I think the essayist is correct in saying, "Cut away everything in order to get direct access to the canals." Your crown will not be worth anything unless the roots are in good shape.

There is the question of getting along without mirrors. I was surprised at Dr. Shepard's paper yesterday, that there was a necessity for such a paper. Perhaps it was owing to my instructor that I learned to use the mirror. On my cabinet I have four mirrors, all magnifying. I have four different sizes, and I presume I work with a mirror nine times out of ten. I cannot conceive how it would be better or easier to see a cavity by tipping the patient back and looking directly into it than by standing erect and using the mirror. I have used peroxid of hydrogen and bichlorid of mercury 1-5000, placing it with a broach in every canal I open, irrespective of the condition of the pulp. I will not drill from one-sixteenth to one-eighth of an inch without making sure my canal is clear ahead. I use the rubber-dam if possible, and if not I do without. I sterilize everything as I go along.

There is difficulty in inserting a screw with cement if it fits at all snugly. Filing a groove lengthwise of the screw allows the surplus cement ahead of the screw to escape, and it is inserted as easily as if the cement was not there.

We may have two or three hundred drugs, and yet could keep house well with half a dozen of them.

In treating a fistula, I should prefer to treat it surgically and break it up than depend on nature to get rid of it. I should prefer to use iodoform in small quantities in place of as much hydro-naphthol as the doctor does in his cement. I think the doctor has polished up the signboard to the road of success when he recommends thoroughness in cleansing and the use of germicides. We must first get cleanliness, sterilize what is left, and then fill to the best advantage. The mummifying method has come into vogue at present. It is not applicable to putrescent material, but to normal, living pulps that only ache slightly. Pulp-tissue left in a canal will become putrescent if it gets a chance, and the mummifying method is supposed to prevent that. It is a question whether it does.

Dr. H. D. Hatch. I want to speak on one point, and that a mechanical one. I have used the method of screwing in metal posts in building up badly decayed molars for eight or nine years. I have had many failures. They have come back to me sometimes after two or three years when done in this way, I having weakened the tooth so much by reaming it out to fit in these metal posts that from mastication the tooth split in a way that was irretrievable,—*i.e.*, the root split vertically. A dead tooth must always be a weaker tooth than a live one, and it grows weaker as the years go by. We may think it is a success for the first year, but after a while a strain may come upon it that will break it. Especially is this so in first bicuspids, where we usually have two small parallel canals and the root not very large, and we drill there in a way that is calculated to weaken that tooth decidedly. But if, in *addition* to the post, we put a band or ferrule *around* the neck of the tooth we have a good operation. I believe in this method in some cases. I have restored old roots that were almost complete wrecks, built up a little amalgam on them, and they have done service for years; but, other things being equal, I would prefer a *good* gold crown.

Dr. Goldsmith. In drilling root-canals or using steel broaches bichlorid of mercury or peroxid of hydrogen should not be used, as the peroxid has an oxidizing action and the sublimate is very corrosive; and you will have many broken instruments if you proceed in that way. The last speaker was right when he said you render a better service by putting on a good gold crown. Dr. Retter's method may be very good in some instances, but to my mind the far better method to pursue with badly broken-down teeth is to set posts, as he suggests, build an amalgam filling around them, and then set a gold crown of which the cervical tenth is made of pure gold; the object of the latter obviously being to permit burnishing the crown to the root.

Dr. Stowell. I wish to speak in the highest commendation of Dr. Retter's method of laying a foundation on which to build. I have done that, always using a platinum-iridium screw or dowel of the same metal cemented into the root, and building up around that. I would build upon this foundation a crown either of gold or porcelain, and expect the very best possible results. The root would gain strength by use. I would not expect to build a large bridge where great stress was required, upon a weak foundation. It would not be good dental bridge engineering, but we can restore to great usefulness an otherwise worthless root by treating after Dr. Retter's method.

Dr. Beach, of Buffalo. I simply would like to reply to a question asked by Dr. Barnes, as to some means of introducing cement into the pulp-canal without its drawing away with the instrument in crowning, or in any case. It may be done by moistening a small square of blotting paper with aromatic sulfuric acid and passing the face of the instrument over that, slightly moistening it; then the cement may be forced up with that instrument without its drawing away, and, by the way, it is an excellent manner of introducing cement linings in teeth. Bibulous paper or pellets of cotton may be moistened with the aromatic sulfuric acid, and the cement taken up on that and caried to the surface and laid over, and then the pellets withdrawn, leaving the cement there.

Dr. F. D. Nellis. I rise to speak in the highest praise of Dr. Retter's paper as to what can be done with the class of teeth he has taken in hand. The tendency is a failure in cases like those he has given if we do not take into consideration the histologic formation of the tooth, and build from that standpoint.

We too often lose consciousness of the fact that the teeth are of dermic origin; are surrounded by both periosteal and periodontal membranes natural to the alveoli and the teeth. These two membranes interchange fibrous tissue, and in a physiological condition hold the tooth in place.

When caries and neglect intervene, sooner or later much of the crown is swept away. If the destructive tooth-crown has advanced to the root bifurcations, the soft tissue of the gums will oftentimes be found lapping over and onto the ragged edges of the decayed tooth; the membranes alluded to will be hypertrophied and chronically thickened, hence all treatment should be of sufficient duration to reduce or nullify recurrent conditions. This is no easy task, for the removal of the gum-tissue must be so radical as to make an approach to the root-canal perfect, or the superstructure, no matter how well reared, will prove a failure. The promised goal once attained through rational treatment, the root-canals approached and cleansed to the very apex, the diameter and depth of the mortise must be determined by the size of the root or root-canal. The tenons or pins should be so carefully prepared as to fit the walls of the mortise fairly well, unless they are inserted by screw-thread, otherwise they will loosen, as they invariably do if cement is depended upon to hold them in place. Further procedure would consist of thoroughly filling all interspaces that could not be occupied by the tenon or pin with oxysulfate of zinc cement. The pins now firmly in place, the filling and superstructure composed, if it is desired to use the roots of a molar whose crown is broken away, the ferrule made of sheet platinum should be so constructed as to fit the stump bases perfectly; then fill with amalgam, over which and on which can be placed a crown made of gold and articulated to meet the occlusion opposite tooth.

Dr. HANNING. The point of the paper is this: to remove the stress of mastication from the crown to the roots. The filling supports the remaining walls, rather than the walls the filling.

Dr. RETTER. The doctor said after two or three years the shells break off.

Dr. HATCH. I do not mean they crumble, but that the leverage having been far up in the tooth, the entire length is split.

Dr. RETTER. I never had that occur in my practice; not when the screw-post is screwed and cemented into the root as described. After a number of years, it is true that the walls or shell part may break off. Many times a clerk will come into your office and wants a tooth like that saved. If you say, "You want to crown it, and it will cost twenty-five or thirty dollars," he says he cannot afford it. If you fill a tooth in the way indicated and it gives satisfactory results after a few years, even if the walls should break away after that time, he will be willing to pay the additional ten dollars to put a crown on. It is all ready; the shell does not support the tooth, but the filling does. If you have a barrel full of lead and you fix it so that the strain is on the staves, they will soon break away; but if you fix it so the weight is not on the staves they will last a long time, although weak. So it is with the tooth.

It is impossible to make everybody agree on the kind of medicaments used. I tried to speak of general principles. Every operator has his own peculiarities in carrying out details. The main point was to lay out a general principle, letting each one follow his own method in the detail application of it. Dr. Barnes said he found poorly-fitting bands that were tolerated under the gum. That is no excuse for the poorly-fitting bands. The foulness under the gums is unhygienic, and will give rise to disease. When the band on a crown is fitted it should be perfect, and there is no excuse for ill-fitting ones, even if the gums do tolerate them. Sometimes a party may live in a house where there is poor sewerage and a bad smell all over the house, and yet not get typhoid fever; but that is no excuse for bad sewerage. Sometimes the roots are a little curved, and in drilling down you may not get exactly to the end and be sure it is all removed. Do the best you can. As I drill I put in a fine broach from time to time, feeling my way. When all is removed I have the root in the best condition to impregnate and apply the necessary remedies to preserve that tooth. Because we cannot be sure that all is removed is no reason why we should not remove as much as we can.

Dr. R. M. Sanger, of East Orange, N. J., read a paper entitled "Novelties in Prosthetic Dentistry," for which see Dental Cosmos for September, page 866.

Discussion.

Dr. Hart. I think the suggestion of Dr. Sanger is eminently interesting to us all, because at the present moment so much thought is directed to porcelain inlays and porcelain extensions to the tooth, as found at the dental depots. In the case of a root the canal of which has been enlarged to any extent by caries, the dowel, as indicated by Dr. Sanger, formed by a thin piece of platinum and then fastened to the pin in the Logan crown by a porcelain pole, will permit the operator to make use of less oxyphosphate, and consequently give a much firmer hold for the finished crown. In any event, the minimum amount of oxyphosphate that is used to fasten a crown is of considerable advantage, inasmuch as depending upon considerable cement is sure to give a weak hold, and result in the final loosening of the crown.

Dr. A. R. Cooke. The application of this principle to the extension of the crowns as we buy them is a very important matter. I have found it necessary to go to considerable trouble to match the color I wished. If I had an apparatus such as Dr. Sanger described I should not have had such inconvenience. I judge from the description that it would be very serviceable.

Dr. M. L. Rhein. The paper of Dr. Sanger interested me very much, after looking at the specimens which he presented. In the first place, it has demonstrated to us what a valuable aid we have had in the past few years with the electric furnace in enabling us to get crowns properly, almost perfectly, adapted to the margins of the roots, one of the most important points in the insertion of an artificial crown. Having the pin or dowel fit the canal as closely as possible, in order to have a bearing as contiguous to the inside periphery of the canal as possible, is another important point. I believe this strengthens the wearing capacity of a root very materially.

The point which perhaps was overlooked by the essayist was the question of replacing a crown of this kind in case of need. I have no doubt but that the essayist has practiced a method which he does not dwell upon in his paper, but, as it seems germane to the subject, I might say the great objection to the cementing of a crown in place is the possibility of its not being readily removable. I do not think a crown should ever be placed in such a position that a repair cannot be easily accomplished. The method of having gutta-percha in the canal and a little oxyphosphate or cement right at the surface is a very admirable one for this purpose, as the minute portion of cement can be very easily removed and the crown taken out by the simple application of heat.

In reference to facings with gold backing, I think that is the more ideal form of a crown if proper care has been given to its construction, because it leaves the crown in such a condition that the root need never be interfered with again after the crown has once been placed in position. A facing should be placed in such a way that it ought to be a matter of very little effort to replace it in case of a fracture, which we know is always a possibility. The method mentioned by Dr. Sanger is one with which I am familiar, and it certainly answers a very admirable purpose.

A member of this society, Dr. Van Woert, of Brooklyn, has given much attention to this matter, and I doubt whether sufficient credit has ever been given to Dr. Van Woert for what he has done in the matter of removable facings and the addition of porcelain for the proper construction of crowns and bridge-work in this way. Dr. Van Woert for the past ten years has devised many admirable methods of this kind, and it is a pleasure to me in this public way to express my appreciation of the many devices that I am personally aware have been originated by him.

Dr. SANGER. In presenting two phases of this class of work, one can only present a very small portion of the entire work. One could talk for a week on the possibilities of the furnace and the use of porcelain in connection with prosthetic and operative dentistry. In regard to the encomiums paid to Dr. Van Woert in connection with my paper, I trust the gentlemen will distinctly understand that if Dr. Van Woert has suggested the same methods as I have to-day it is entirely without my knowledge. I do not believe that Dr. Rhein meant that I had borrowed Dr. Van Woert's method and presented it as my own.

Dr. RHEIN. My remarks about Dr. Van Woert had no bearing whatever on Dr. Sanger's paper.

INTERNATIONAL DENTAL CONGRESS.—MEETING OF AMERICAN COMMITTEE.

THE committee appointed by the National Dental Association at the Omaha meeting, August 30, 1898, was by order of the chairman, Dr. A. W. Harlan, convened at the Cataract House, Niagara Falls, August 1, 1899. No quorum being present, was adjourned to September 3, at 4 P.M.

There were then present A. W. Harlan, of Chicago; H. A. Smith, Cincinnati; Thomas Fillebrown, Boston; T. E. Weeks, Minneapolis; J. D. Patterson, Kansas City; H. W. Morgan, Nashville; T. W. Brophy, Chicago; W. C. Barrett, Buffalo; W. W. Walker, New York city; W. E. Griswold, Denver, Col.; B. Holly Smith, Baltimore; J. Taft, Cincinnati, O.

The meeting was called to order by the chairman, who gave a short address stating the object, organization, etc., of the congress, and the work necessary for the committee to accomplish in this country.

Dr. W. E. Griswold was elected secretary. Dr. Wm. Jarvie, of Brooklyn, N. Y.; Dr. H. S. Sutphen, of Newark, N. J., and Dr. George H. Chance, of Portland, Ore., were elected as additional members of the committee.

The chairman and secretary were instructed to confer with the National Association in regard to arranging an earlier meeting next year, to accommodate those going abroad.

On motion of Dr. Barrett, a place on this committee was reserved for the president of the National Association in the year 1900, and the chairman was authorized to insert his name.

On motion of Dr. Barrett, a resolution requesting any member of this committee finding himself unable to go abroad to attend this congress shall at once resign, and that the Executive Committee be empowered to fill the vacancy, was passed.

On motion of Dr. Smith, the chairman was requested to appoint a Transportation Committee, composed of Dr. Jarvie, Dr. Walker, Dr. Harlan, and Dr. Griswold.

A committee consisting of Dr. Brophy, Dr. Weeks, and Dr. Morgan was appointed to take charge of the exhibit of American educational methods.

An Executive Committee of five was appointed, consisting of Dr. A. W. Harlan, chairman; Dr. Barrett, Dr. Brophy, Dr. E. C. Kirk, and Dr. H. A. Smith.

The Executive Committee was empowered to fill vacancies in this committee.

Adjourned to meet at call of chairman.

W. E. GRISWOLD, *Secretary*,
423 Mack Block, Denver, Col.

NATIONAL DENTAL ASSOCIATION.

(Continued from page 1057.)

FIRST DAY—*Evening Session* (Continued).

DR. R. H. HOFHEINZ, Rochester, N. Y., read a paper entitled "Manual and Artistic Training in our Preliminary Education."*

DR. JAS. TRUMAN. I am glad that some one has had the moral courage to denounce the inartistic operations that are daily performed in dentistry. To my mind the statement of the essayist is correct, that we lack esthetic culture when we place a gold crown on a front tooth.

I was particularly pleased with that portion of the address in which the essayist stated that a young man who at eighteen had failed to acquire manual dexterity could rarely or never acquire it. That has been my belief for many years. When a young man attempts the study of dentistry, takes first four years of medicine, after having passed through his early preliminary training in the high schools or colleges of the country, he will probably be twenty-two or twenty-three years of age when he begins the study of dentistry, and I contend that by that time the whole practical manual ability of that young man is lost. Hence we find that those who have taken the medical course in our dental colleges rarely or never acquire manual dexterity unless they have special mechanical ability. Let us take this to heart.

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*This paper is printed at page 1094, current issue of the DENTAL COSMOS.

I wish to congratulate the essayist on the very excellent preparation of his paper. I regard it as almost a model of its kind.

Dr. Black. This paper has interested me greatly. First, I want to compliment the essayist upon the literary character of his paper, and I wish to accentuate what Dr. Truman said upon that point. It is most excellent, and the thought contained in the paper is what we need at the present time. I am most heartily in accord with the idea of the necessity for the acquirement of manual training in our school career. While students are yet young they should learn to use the hand; not in an ideal way, but to accomplish something, to produce something that shall be useful, or something so conceived and constructed as to train the hand to useful purposes. With all our boasted skill in the technique of dentistry, there is yet much to be gained in the future in the skill of the hand, and perhaps more in the direction of that manual skill by the mind,—the development of that which will be of lasting use to our patients, the mind and the hand working together for good; not only for that which pleases the eye, but for that which is so conceived and constructed that it shall endure. This means much to us in the mental make-up of the man, as well as in the make-up of his handicraft.

I wish now to accentuate what was said by the essayist, and also what was said by Dr. Truman, in regard to placing gold crowns on front teeth. It seems to me that is a mental debasement. The wonder is that he who has no more taste than to do such a thing should find patients who would submit to it; the greater wonder that a man supposed to be educated in the taste and skill of which dentists boast would do such a thing. I commend this paper to you, gentlemen, for future study when it shall be printed, a paper to be read and re-read in the year before us.

Dr. Sitherwood. I only wish to say a very few words in favor of this paper. I was greatly impressed with it. For a proof of its truth I only call your attention to the fact, which is well known to all educators, that there comes a time in the life of every individual when he cannot learn to write, when the hand refuses to obey the mind, when, in other words, it will take him years to learn to write his own name.

Another thing to which I wish to refer is the growing tendency of students to go into dental colleges with no other preceptors than the faculty. Thirty or forty per cent. of the students who enter dental colleges have no other preceptors. I claim that the student who has no manual training in a dental office before he goes into a dental college cannot in the few years he is there acquire the manual skill that he would otherwise acquire if he had had some manual training in an office before he entered the college. In proof of this, if you will take a graduate from the best dental college in this country into your office and put him to making a piece of bridge-work, plate-work, crown, or whatever it may be, you will find he is deficient in manual skill unless he has learned it somewhere; that is, if he belongs to the thirty or forty per cent. noted on the printed lists of the college as having the faculty for his preceptor. I understand that there are some gentlemen who do not desire to have students in their offices, but it is a misfortune to the young man who goes into a dental college not to have had some previous training, just as the essayist has stated that it is a misfortune to the student not to have had training in drawing, or whatever it may be. You all know that there is a tendency among educators at the present time to give this manual training to the young, because there comes a time in life when they cannot acquire it.

Dr. Brophy. I have listened with a great deal of interest, pleasure, and profit to the paper which has been read, and I approve most heartily of the sentiments expressed therein, and also of the sentiments expressed by the first two speakers in the discussion; but I must confess that I am quite surprised at the utterances of the last speaker. It is quite evident that he is discussing a condition of things that existed about twenty years ago. At the present time the average young man enters a dental college after spending several years in an institution where manual training is insisted upon, and when these young men come to college they are not ignorant of the use of instruments. They have acquired a knowledge of them, and they are prepared to take up the study of dentistry intelligently. Moreover, in the course of technical work now done in schools of dentistry a student can learn more in three months than he would in about as many years in anybody's office. So I think that the remarks of the gentleman (Dr. Sitherwood) about the deficiency in manual training of the young men of to-day are not well founded.

Dr. C. N. Johnson. I have promised not to take up much of the time of the meeting, but I was very much pleased, as the other speakers have been, in listening to that paper. There is just one feature of it, however, to which I want to take exception; not to the ideas expressed by the gentleman himself in his paper, but to the impression that may go abroad as a result of the paper. That is, that the tendency to-day is to specialization to too great a degree. We are in danger of that. I have always been something of a stickler for the broadest possible fundamental education for a professional man of any kind, and I fear that if we carry this matter of specialization too far we shall become narrow-minded, because that is the tendency of too much specializing. And I want to say that of all the narrow-minded men I have ever known on the face of the earth, a narrow-minded dentist is about the most narrow-minded. In the practice of our profession we are obliged to work all the time upon the minutiæ, upon the little things, and unless we are very careful we shall become narrow. While having in mind the sentiments expressed in the paper, we want to keep in mind as well the sentiments of broadest possible culture in our education, otherwise we shall not be known as an educated profession.

Now, just one word more in regard to the remarks of my friend, Dr. Sitherwood. I would have been in sympathy with him at one time when he made the statement that the best student was the one who had two or three years in a preceptor's office before coming to college, but I wish to say that it depends largely upon the preceptor and largely upon the college, and in my experience in college work I have almost invariably found that in the cases of many students sent to us by practitioners we were obliged to spend the first year at least in correcting the mistakes of the preceptor's teaching. That does not necessarily apply to all students, but it has been an actual fact; and I wish to say that the gentleman who makes such a statement as I have referred to, or to any gentleman who thinks as he does, that if they will visit the dental colleges of this country and see the extent to which we are introducing manual training from the very bottom until the student leaves us, they will have a higher idea of what we are doing in that direction to-day.

Dr. Sitherwood. Do I understand Dr. Johnson to decry the idea of a young man preparing to enter a dental school under the guidance and teaching of a preceptor?

Dr. C. N. Johnson. I made the remark that it depended largely upon the preceptor and largely upon the college. If we have a good preceptor, who will give his student the best facilities to study and to develop this manual training, I have no objection at all to that student being under a preceptor. Some of the best men in this room never attended a dental college at all. I have as much respect for my profession as any man, but it is a fact that in many offices to-day the methods that are taught the student are the methods of a quarter of a century ago, and they are not in accordance with the methods that should be taught to-day.

Dr. Sitherwood. I am ready to grant that, but I was discussing principles, not individuals.

Dr. Newkirk. It has been a long time since I have heard a paper which interested me more, and the principles of which seem to me to be more nearly correct, than that to which I have listened to-night. I was particularly struck with the statement that unless the young man develops some manual skill, the ability to do some one thing with his hands early in life,—and I think the age of eighteen is reasonable,—he will not succeed in the work of operative dentistry. I have a rather striking example in my own experience to corroborate that view. I was a farmer's boy, and my hands, of course, were clumsy; but at the age of sixteen I had the disposition to do something mechanical, and I took up the study of penmanship. I had a friend who gave me some instruction, and he told me to take the finest kind of a pen and to make fine lines with a slow movement. So, after working all day on the farm, I sat up nights, sometimes until midnight, to cultivate that talent, until I had control over the pen and could guide it as I wished, although when I began my fingers were absolutely uncontrollable. To that first training I ascribe the steadiness of hand and nerve which I believe I possess to-day in the handling of dental instruments. Now, it seems to me there must be the disposition in a boy to do something of that sort with tools or else he will never by any sort of training succeed in the practice of dentistry.

One word more in regard to what has been said by Dr. Sitherwood, Dr. Brophy, and others. I used to be rather favorable to the idea of the students spending some years under a preceptor. Lately I have visited some of our schools in Chicago, which have been conducted on the modern plan, and have seen some of the preliminary technical work of the first-year students, and I must say that it was a revelation to me. If Dr. Sitherwood will visit those schools where this technical work is carried on, he will get a revelation.

Dr. SITHERWOOD. I have visited them.

Dr. NEWKIRK. Did you see what I saw?

Dr. SITHERWOOD. I did.

Dr. NEWKIRK. Well, it did not make the same impression on you that it did on me.

Dr. B. HOLLY SMITH. It is unreasonable to suppose that any one could outline or sketch with accuracy the probable future of a boy who starts into his life-work. I have had boys who never acknowledged that they had performed the desperate feats of agriculture which the last speaker claims to have performed, who, nevertheless, without any experience with a preceptor and without any apparent manifestation of peculiar mechanical ability, have developed into remarkably clever and skillful operators. I claim that you may have your polytechnic institutions, you may have your system of training in dental offices, and still you have not the ideal system probably for every boy. All boys are not alike. My boys do not resemble, to me at least, the boys of my neighbors. My neighbors' boys are bad boys, and my boys are good boys always. You do not know what intellectual or mechanical turn your boy is going to take. I have no doubt that under our present system of training, which Dr. Brophy has outlined, there is probably an ideal system; that is, the system of sending your boy to some polytechnic institution, where his mind and his hand are trained together. The old system of tutelage under a preceptor will gradually improve as the preceptors are developed. Remember that preceptors all over this country are developing. A young man who had been a student at our school, and who by courtesy was invited into my office for three weeks, was taken by me to the side of my chair during that time. He was a former pupil of a college in this state, and he told me that he had learned more in the three weeks when he stood by my chair than he had learned in school. If preceptors will take the boys and stand them by their chairs, then I would say no student should ever come into a dental college who had not received some instruction at the hands of a preceptor. But what do we do with them? Often they are put not even in the first laboratory, but away back in the last laboratory; this boy attends to the vulcanizer and other things, and probably collects a few bills on the outside. Now, if you gentlemen want to say that colleges shall not receive any students except from a preceptor, be honest, be fair, and I think you will be right.

Dr. HOFHEINZ. I was apprehensive that I should have nothing whatever to reply to, because the remarks of Dr. Truman, Dr. Black, Dr. Brophy, and others were so very flattering and so much in accord with what I said that I thought I should not have to reply. I am very glad that Dr. Johnson has spoken, because I take exception to his exceptions. He remarked only too correctly that to specialize our education too much will narrow our intellectual horizon; but remember that what I have here advocated is not intended to narrow the horizon, but to broaden it. It gives the boy a chance to decide for his future; to say to himself, "I am fitted for a profession which depends largely upon manual and artistic skill." He is unable to do that if he has not received the training that I have here advocated. If he is obliged to enter a college or a dental office without such previous assurance, it will necessitate an expenditure of time which will narrow down his other studies. The very effects desired by Dr. Johnson, where manual training and mental training go hand in hand, are found under this system, and in proof of that I have quoted abundant authorities in my paper. I will not undertake to refer to them all now, but one of them says that "pupils who were noticeably careless in their work in academic lines became ambitious to do work which compared favorably with that of other pupils, and it seemed to me that those pupils were somewhat inspired by self-respect and pride," etc.; and it is the opinion of these authorities that it does not narrow the mind, but that the mind is broadened by that specialization in early training which gives them a chance to choose the proper sphere in life.

I want to thank the first two speakers for their complimentary remarks in regard to the literary style of my paper. Perhaps that is not due to myself, but to the fact of the many quotations which I have given from such eminent men as Emerson, Goethe, Fiske, etc.; but if I have ever been rewarded for an effort made under physical difficulties, I certainly have in writing this paper.

SECOND DAY—*Morning Session.*

The association was called to order at 9.35; President Burkhart in the chair.

After the dispatch of the regular routine business, Dr. N. S. JENKINS, Dresden, Germany, read a paper entitled "Porcelain Enamel Inlays."*

Dr. JOHN I. HART. I am impressed with the idea that this association is deeply indebted to Dr. Jenkins for the presentation of the essay to which we have just listened, in which he has given us the result of his labors. I think that the interest manifested in this class of work is a refutation of the ideas expressed in the discussion at the last session,—that we are drifting toward commercialism and that we lack esthetic refinement.

While it is true that we have made a study of porcelain for some years past in a desultory fashion, it is entirely due to Dr. Jenkins that the present interest in this class of work has been stimulated. Personally, I prefer a higher-fusing body than that made use of by Dr. Jenkins, but the detail of the operation has surely been perfected by him. It is essential, in using the higher-fusing body as indicated in the essay, that we make use of platinum as a matrix. If the platinum was properly annealed, I have not encountered the difficulty indicated in the paper in carrying it to the base of the cavity. By using the platinum as a matrix, one is enabled to try in the inlay, and, if sufficient contour has not been provided for, to add to the inlay without reinvesting. This is impracticable under the method explained by the essayist.

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*This paper will be found in the DENTAL COSMOS for September, page 888.

I have found the carrying of the platinum into deep cavities simplified by a method which I shall describe, which has probably suggested itself to many of those present, but which may prove useful to some others.

Having prepared the cavity, take an impression of the tooth and cavity with modelling compound, chilling the same with ice, so as to get as definite margins as possible. Pour into the impression the oxyphosphate of zinc and allow the same to crystallize. Then separate, and we have a replica of the tooth and cavity in the oxyphosphate of zinc which will stand the burnishing of the platinum far better than would the plaster of Paris. Having burnished the platinum into the cavity, in the impression, and well over the margins, then pack the body into the cavity about two-thirds full. This is removed and fused. This, after it is cooled, is carried to the cavity in the tooth and pressed home, and the platinum thoroughly burnished over the margins. In this way we can try in the piece, and get thorough adaptation of the platinum with much greater facility than if we attempt to burnish it into the tooth originally. After removing the platinum I think it is distinctly advantageous to make use of the hydrofluoric acid on the surface which rests next to the tooth, which is held in place by the oxyphosphate of zinc, so that we get a roughened surface, and in that way get a better hold of the inlay, so that there is less danger of its being forced out under the stress of mastication.

The method which I describe—of taking an impression of the cavity—I would only consider indicated where the cavity was extensive and more than one surface was involved.

Dr. E. T. DARBY. There is perhaps no subject engaging the attention of the profession at the present time with more intensity of interest than this matter of porcelain inlays. I do not rise to say anything new upon the subject, but rather to indorse the methods suggested by Dr. Jenkins. It was my privilege two years ago this summer, through his courtesy and kindness, to spend a week or more with him at his home in Dresden. While there I had ample opportunities for observing his methods, and saw the beautiful and artistic way in which he performed these operations. I also had the opportunity of witnessing operations which he had performed months, and even years, previously. To say that I was charmed with the results which he produced is to say but one-half that I experienced. I was amazed—I was gratified beyond description—to see with what beauty and with what accuracy of fit and harmony of color he produced results. I have never seen anything in the way of operative dentistry that suited me so well. Many of those operations were faultless in color, and were faultless in fit so far as the naked eye could discern, and at a distance of twelve inches from the mouth of the patient I could not detect the line of contact between the porcelain and the tooth.

Through his generosity, I brought with me from Germany a complete outfit, which has enabled me to make these inlays. In my earlier experiments I found that I had some difficulty in making what I considered a perfect inlay; but, as in everything else, experience made perfect, and after a little practice I found that I could produce results that were exceedingly gratifying to me, even inexperienced as I was. The longer I have experimented with this method, the more care I have taken in the performance of the various steps in its progress, the more certain have I become that it is one of the greatest blessings to the dental profession, one of the most satisfactory things to the community at large, and that it is destined to prove one of the greatest improvements in dental practice. It is not a thing for the careless man to undertake. It requires care in every detail; but there is not a man present to-day who is competent to practice dentistry who cannot, with a very little experience and painstaking effort, produce results that will be eminently satisfactory to him and absolutely satisfactory to his patients. Therefore, gentlemen, I commend to you in the heartiest and most emphatic way possible the beauty, the simplicity, the artistic character of the work which Dr. Jenkins has described.

Dr. C. N. Johnson. Lest this matter may seem to go all one way, I should like to say a word or two. I must first compliment Dr. Jenkins. I feel personally indebted to him for coming so far and reading this paper. It is a clear-cut, well-defined paper, easily understood, and I have nothing but praise for the presentation of the subject; but I want to throw out just one word of caution.

In one place in the paper the intimation was made, as I understood it, that this method could be easily practiced or readily comprehended by the average practitioner. If I know anything about inlay work at all, it seems to me that of all work that we are to do in operative dentistry there is nothing that requires such accuracy of attention to details in every particular as the performance of that work, and the reason I arise is to caution the profession about running too thoughtlessly after this innovation, without due contemplation of what they are undertaking.

Inlay work is not new to the members of the profession in the United States. It was introduced years ago, and I think I will be corroborated by the older practitioners who have been observant when I say that inlay work in the United States has done a very great deal of injury and has brought much reflection upon the profession; not because, possibly, of its inherent defects, but because of the fact that in order that it may be done to the best advantage the requirements are so severe, the details so intricate, that the average practitioner, without due study, is not likely to perform that work successfully.

I was impressed in just one other particular by the remarks of

Dr. Hart when he outlined so beautifully the method of making that inlay, and I felt that by the time he got the cavity prepared, and the matrix made and the inlay fused, an operator of average ability would have had the filling of gold inserted. And I feel, gentlemen, that when you take gold foil and understand how it is to be manipulated, and place it against the wall of dentin or the wall of enamel, in perfect contact as it can be, it is going to remain there. There is not going to be a leak at the joint. There is no danger of the cement dissolving out, as there may be in inlays not properly constructed. And so in the large number of cases, while I deplore as much as any one the showing of gold in the anterior part of the mouth, yet so far as the utility of the operation is concerned I shall still give my preference to gold filling.

Dr. Head. A French lady, speaking to a well-known New York dentist concerning a defective front tooth, said, "I cannot have it filled here, because you will put gold in front teeth. I want white filling." But the dentist said, "I can put white filling, only gold is so much more permanent." "Yes," she answered, "but over in France we would rather be temporarily beautiful than permanently ugly." The fact whether porcelain inlays will last or will not last is not open to discussion, because we know that they have lasted. We know that even the old porous glass fillings, that tended to turn dark from the action of the saliva, lasted from eight to ten years, and, as far as the edges are concerned, showed signs of being able to last eight or ten years longer.

Therefore I am not here to defend the durability of porcelain fillings. I am not here to defend the fact that some dentists may be able to do better work than others; but I do affirm that any dentist who is capable of putting in a good gold filling has sufficient mechanical ability to learn to put in a good porcelain filling.

In the profession of dentistry, some operators put in better gold fillings than others. We have even heard it said that with the work of the average operator the average life of a gold filling is not over five years, and even with good operators I have sometimes seen fillings, average fillings, which made me doubt that the average life was so long as five years. Porcelain work is not easy, and those who attempt it have the same disappointments and sorrows that awaited them when they started to learn the art of gold filling.

But now I should like to discuss some special points of porcelain work. I admire Dr. Jenkins's operations exceedingly, and any good operator can obtain excellent results by his system; but low-fusing porcelain has heretofore been found unsatisfactory, and for these reasons the Jenkins porcelain is at present only on trial. On the other hand, we have an easily worked, high-fusing body of consistence and strength equal to continuous gum, that has been used for the last twenty or thirty years without showing any deterioration in the mouth, and it seems unwise to turn from an old friend and take up a new and untried friend, however beautiful that new and untried friend may appear.

As I understand Dr. Jenkins's system, the gold matrix is made from the finished cavity, and then placed upon asbestos and the porcelain flowed in, thus allowing the porcelain when it is hot to contract in the matrix and run the risk of causing distortion, which would naturally arise from the unequal expansion and contraction of the porcelain and the metal. On the other hand, where the bare platinum matrix is used, the matrix is burnished into the cavity and the porcelain is fused into it almost up to the edges. The matrix with the fused porcelain is then replaced in the cavity exactly in its former position, and the edges are burnished down a second time when the finishing porcelain is added. This second burnishing makes it possible to do away with the distortion caused by the unequal expansion of the porcelain and the metal, and makes the final edges almost perfect. With the simple circular cavities the single burnishing is ample, and is in many instances all that those in America use; but where one has to fill a cavity with compound curves on approximal surfaces, the expansion and contraction are apt to throw the edges out of line. And observation of such fillings made by the Jenkins system has confirmed the force of this objection; but this objection does not, of necessity, hold against the use of the Jenkins porcelain. As Dr. Jenkins has said, a second burnishing is quite possible if the operator so desire, and that brings us down to the point as to whether the low-fusing or the high-fusing material is the better of the two. The principal point involved is whether equally good adaptation can be obtained with thin platinum as with thin gold. If the platinum is badly treated, if it is not annealed in a furnace where no gas can reach it, the platinum will be hard; but if a platinum foil one-one-thousandth of an inch in thickness is annealed properly it will be found to be almost as soft as lead. If this platinum is placed over the cavity, pushed in with cotton or bibulous paper as far as possible, and then while immovable is carefully burnished into place with a steady circular motion, I think the ordinary operator will have no difficulty in obtaining a perfect matrix.

So the two systems are before you, gentlemen. Naturally, I cannot speak to you from an unbiased point of view, as I am an advocate of the high-fusing material and the platinum matrix; but I wish especially to emphasize the fact that in the use of porcelain by either method it is the mechanical skill and care of the operator which will give good results, and without that care and skill good results cannot be obtained by either method. But given an equal amount of skill and care, in my opinion the high-fusing porcelain and the platinum matrix will in the long run result in the greater number of successes.

Dr. George Evans, New York City. I recently procured from Dr. Jenkins a set of his porcelain enamel or inlay material. I have not as yet had much opportunity to use it for inlays, but I wish to report some experiments I made with gold crowns. I find that seamless crowns made of pure gold or gold slightly alloyed with a small percentage of platinum can be enameled with Dr. Jenkins's porcelain. The gold crown is first fitted to the tooth and the grinding-surface, then thickened by scratching the inside surface of the gold cusps and packing on the roughened surface freshly annealed pellets of gold foil, which adhere to the gold, and next thoroughly condensing with revolving agate points. The exposed labial surface of the gold is then ground thin, pressed in against the surface of the natural tooth, and punctured. The proper shade of porcelain body is placed on the depressed section and fused in the same manner as an inlay. I have also succeeded in another method: I take an S. S. White Dental Manufacturing Company tooth that corresponds in size and color with the other teeth, remove the pins, and grind the tooth down thin until there is nothing left but the mere front of the porcelain. I attach this front with Dr. Jenkins's porcelain body to the gold crown, and, judged from an esthetic point, get a result which will be a great advantage in this country where so many gold crowns are used. I have some specimens here, and will show them to you at the clinic this afternoon. At the same time I will demonstrate the cementation of bridge-work with gutta-percha. I am very much interested in this branch of porcelain work, and have carefully considered the respective merits of high and low-fusing bodies. I will acknowledge that until recently I was prejudiced against anything you might designate a low-fusing body; but when I saw some of the results obtained by Dr. Jenkins at the New Jersey State Dental Association, at Asbury Park, last month, and the close joint he made to the margins of the cavity, I was immediately convinced he had an advantage to some extent over the high-fusing porcelain. Merits that we have to consider regarding a porcelain inlay are close fit to the margins of the cavity, strength, and appearance. Dr. Jenkins's porcelain seems to possess these.

As to durability, I cannot speak on that. We have to depend on the statements of Dr. Jenkins, and also Dr. Darby, who has had quite an experience in its use and presented the subject at the New York Odontological Society over a year ago.

Dr. McKellops. I have only a few words to say, not on porcelain work, because that is not my hobby; while, as you all understand, gold work is. But what I want to contend is that when the profession get down to the practice of using platinum-gold for front cavities, there is nothing in the way of porcelain work or anything else that can touch it. I can build work that will wear as well as any porcelain work you ever saw, and at the distance of this gentleman from me you can hardly discover it. There is perfect work. There is work that you cannot wear. You may put it in the mouth of a man who has the most powerful jaws, you may put it into molar teeth, and he cannot wear it out or wear it down, if it is properly done. Why is it that the profession sleeps and lets this thing go by in this manner, when it has been explained to them year after year that you can accomplish such good results? I have traveled this wide world over and I do not see it used, and in spite of my age I am willing to let any man put in porcelain work against what I will put in in platinum fillings in front teeth, and I will accomplish it with more ease and with as great comfort to my patients as they can get with the putting in of porcelain work. Porcelain work is all very well, but when I want durable work and fine work give me platinum-gold. It does not show, it gives the execution and everything that the profession wants and the patient wants, and gives as much satisfaction as any man could possibly give. Of course, it requires a little skill and a little ingenuity of the hand to accomplish these things; but when you accomplish it look at the results you get. But you are afraid to work it. It requires a little skill, but you can accomplish the best results and get more satisfaction than with anything else.

Dr. OTTOLENGUI. It seems to me that discussion is futile where we do not reach finality. This matter of porcelain work has been discussed now at several meetings where I have been present, and identically the same things have been iterated and reiterated on both sides, while the real issue, as it appears to me, has been somewhat clouded, and the disciples of one side or the other have gone away, unconvinced themselves and not having convinced their hearers. It seems to me that there is an opportunity here to settle this matter. The point at issue is whether we shall use a low-fusing body in a gold matrix or a high-fusing body in a platinum matrix. We are told by the platinum disciples that they can return to the cavity and burnish a second time, and that they can overcome the shrinkage. I think it was Dr. Hart who told us that we cannot do that with gold. Dr. Head is coming around, because he has at last admitted that the other side claim they can do so.

We hear a great deal from the platinum gentlemen about the use of an investment. Now, I wish to assert that in any cavity of which a gold matrix can be taken the result can be reached without any investment, and without any shrinkage which will affect the fit, and that the necessity for a second burnishing only maintains with the platinum because you do not, in deep cavities, get that perfection of edge with the platinum which is requisite, and because the gentlemen who are using the platinum, dealing with a material which will stand a high degree of heat, expect to get, and do get, their results with one, two, or three bakings; whereas those of us who desire a more accurate fit and a thinner matrix, as we obtain with gold, are satisfied to get a result after five, ten, or fifteen bakings.

I wish to say that before I left home, as a test of this matter, which was brought up at Asbury Park, I took a molar tooth from which I removed an amalgam filling which occupied the posterior, anterior, and occlusal surfaces, thus leaving nothing but the buccal and palatal walls, and extending down into the pulp-chamber, and that I made for a cavity a filling with the Jenkins method, using No. 30 rolled foil, and placed a satisfactory filling; whereas it has not been demonstrated that that can be done with platinum. I understand that Dr. Jenkins has a cavity here of this deep character, and I wish to suggest that these two gentlemen make their fillings for the same cavity, and permit us to see whether or not with platinum we got as good or better results than with gold, and then let us stop talking about it.

Dr. JENKINS. I wish to express my thanks to the association for the courteous, kind, and generous manner in which it has received me, and to express my obligations to the gentlemen who have spoken upon this subject for the clear, kind, and very instructive manner in which they have spoken upon it.

I would only reply in one word to Dr. Hart, by saying that I fear that I have not made sufficiently plain that the claim I wished to make for what is called my method is its simplicity. There is no question that by the methods which have been suggested great results can be obtained, but why take so much trouble and expend so much time when it can be done with yet greater certainty in a simpler way?

There is no danger whatever, after such a matrix has been placed in its asbestos bed and subjected to heat at any temperature, that this material will crawl or contract or draw together the edges of the matrix. It remains absolutely fixed until the whole process is completed.

I have listened with very great admiration and respect to the claim of our friend, Dr. McKellops, for the great superiority of platinum and gold foil. For years I made a great number of such fillings, in very many cases with such magnificent results as he has obtained, according to my inferior skill. But there is a point which he has not touched upon, and which, perhaps, has not occurred at the moment to so clever and distinguished an operator,—a point suggested, perhaps, in a letter which I chance to have in my pocket from the distinguished author, Mark Twain. He happens to be a personal friend. I may premise that while he is a man of great nerve, he has for some time been in such a state of health that a long-continued operation, accompanied with great nervous strain, would be objectionable. He says, "I have worn a sample in my head"—speaking of the porcelain enamel—"a month or two, put there by Dr. Thomas. For eight years I have worn cement and other kinds of mud in that old crater, and finally in London, last year, the dentist said the walls were so thin and frail he could not venture to put any pressure to speak of on the packing, and I must expect it to work out pretty soon, which it did, and even while it remained I was always uncomfortably conscious of its presence, and was usually fondling it with my tongue. It is all so different now. The plug fits like nature, and of course does not endanger the walls with pressure of any sort. I am not aware it is there, and that old snag is as serviceable a tooth as any one has."

UNION MEETING OF THE DISTRICT OF COLUMBIA DENTAL SOCIETY, MARYLAND STATE DENTAL ASSOCIATION, AND VIRGINIA STATE DENTAL ASSOCIATION.

(Continued from page 1053.)

SECOND DAY—*Afternoon Session.*

THE convention was called to order at 2.30 P.M.; Dr. Chas. L. Steel, president of the Virginia State Dental Association, in the chair.

The following paper was read by CHARLES W. RICHARDSON, M.D., of Washington, D. C.:

DISEASES OF THE ANTRUM.

In presenting this subject for your consideration this morning I have decided to limit my remarks to that disease of the antrum which comes most frequently under your observation, and that which you are called upon most frequently to treat; that is, chronic suppurative inflammation of the antral cavity.

It would seem almost a waste of time to go into an anatomical consideration of the antral cavity; its shape, situation, size, boundaries, position of the ostium maxillare, and the varying changes in its configuration. Nevertheless, under this capitulation I think we would do well to take into consideration the fact that the antrum is not alone in a series of accessory cavities; that the antral and orbital cavities may communicate, and that the size of the antral cavity may vary greatly. As you well know, we have as accessory cavities the antral, ethmoid, frontal, and sphenoidal sinuses. It is well to remember that the orifices by which the frontal, anterior ethmoid, and antral cavities communicate with the nasal chambers are close together, and that anomalies do exist by which the pus pouring from the frontal or ethmoid sinuses may seek direct entrance into the antrum, or false passages may exist between these cavities by which purulent inflammation may give rise to an antral inflammation.

As bearing upon this point, it may be well to call attention to the fact that Dr. Cryer demonstrated this condition at a meeting of one of your dental societies, and, also, Dr. J. H. Bryan exhibited a drawing of a preparation in the Army Medical Museum wherein was shown a direct communication between the frontal and maxillary cavities. Dr. Fillebrown, of Boston, states "that he examined eight cases in which the infundibulum, instead of terminating in the middle meatus, continues as a half-tube, which terminates directly in the foramen of the maxillary sinus. In seven of these specimens there was a fold of membrane which served as a continuation of the unciform process, and reached upward, covering the foramen, forming a pocket which effectually prevented any secretion from the frontal sinus getting into the meatus until the antrum and pocket were full to overflowing." (*International Dental Journal,* 1887.) Dr. Wright, in a discourse on frontal abscess before the last meeting of the American Laryngological Association, stated "that the proximity of the mouths of the ducts of the frontal sinus and the ethmoid cells to that of the antrum of Highmore in the hiatus semilunaris would suggest that secretions from the ethmoid cells and the frontal sinus, in many cases, would drain into the antrum of Highmore. In my investigations I found that by filling the frontal sinus with water, the fluid in almost every case, instead of going out through the nose, passed into the antrum of Highmore."

From this arrangement of the hiatus semilunaris, which is not an unusual one, we can see how an antral abscess can be called into life, and how the pus of an ethmoidal or frontal abscess can prolong for an indefinite time the cure of such a condition.

It is well to take into consideration the roof of the antral cavity, with its relation to the orbital cavity, and how occasionally an antral abscess may give rise to an orbital cellulitis.

One of the most interesting cases of antral abscess that ever came under my observation, a patient who had been treated by one of your most noted members, had a most interesting demonstration of the intimate relationship between the antral and orbital cavities. This patient had extensive exophthalmus, fixation of the eyeball, contraction of the pupil, and excessive chemosis of the conjunctiva. There was dullness of intellect, slow pulse, forty per minute, sighing respiration, and other indications which gave fears for serious intracranial trouble. The antral cavity was evacuated, and a few days later pus was liberated from a very deep orbital abscess. The patient made a good recovery. In this case there was either an extremely thin-walled floor of the orbit, or some point at which there was a direct communication between the soft tissues of the orbital cavity and the antrum without the interposition of a bony separating wall. Through the plates I shall exhibit it will readily be demonstrated to you how the variation in the size of this cavity and its anomalous position may give rise to great difficulty in operative interference and present dangers of great moment.

There seems to be some divergence in opinions as to the etiological factors which are instrumental in the production of this form of inflammatory trouble. Those who work in your field, or have investigated the subject through the reports of cases furnished by dental investigators, are inclined to believe that the greater majority of antral suppurations are the result of dental caries, periostitis, injury and abscess of the roots. Other workers in this field who investigate the subject from a purely rhinological point of view are inclined to believe the major portion of cases to be secondary to inflammatory reaction within the nasal chambers. There is no doubt that both these factors, the dental and the nasal, are productive of about an equal share of antral abscess, with a major tendency in favor of the nasal origin. In the abscess of dental origin it is not necessary that the pus penetrate from the root of the tooth into the antral cavity, or that the tooth project into the antrum; sufficient is it that the inflammation at the root of the tooth be great enough to involve not only the intermediate bony wall, but also the overlying antral mucosa.

The nasal causes which give rise to antral abscess are influenza; acute catarrh, as the result of cold, as well as the same condition when accompanying the acute infectious diseases; chronic catarrh, simple, syphilitic, or tubercular; nasal polypi and new growths; suppurative inflammation of neighboring sinuses; exostoses, and injuries to the nasal cavities and walls of the antrum. In the nasal cases the inflammatory reaction may be transmitted to the antral cavity not only by direct continuity, but also through obstructing the ostium maxillare, thus setting up a passive congestion with an outpouring of serum, which becomes a nutritive field for the pathogenic organism which is the producer of this form of inflammation. This brings us to the consideration of the bacilli which are most frequently found in the pus issuing from or found within the antral cavity. The Staphylococcus pyogenes and the Streptococcus pyogenes, one or both, are usually found present.

The subjective evidences of disease of the maxillary sinus vary greatly. In some patients the symptoms elicited are so pronounced and typical as to lead you at once to diagnosticate a probable abscess, while in others they are so slight as to cause you surprise when you find this cavity involved. Pain is usually a prominent symptom. There may be a feeling of distention of the cavity, with tenderness to pressure over the canine fossa and zygoma. Neuralgic pain over the course of any of the branches of the fifth nerve may be present, but the most constant and persistent pain is that referred to the supraorbital region, in the forehead over the eyebrows. This pain over the eyebrow is usually greatest in the morning, and usually relaxes to a moderate degree after the movements incidental to performing the toilet, which partially empties the cavity and relieves the tension. Marked mental depression has been a very pronounced symptom in many of the cases that have been under my observation, the patients being excessively morose, hypochondriacal, and seemingly fearful of some impending disaster. Mental inactivity, with a disinclination for taxing mental application, is also common with those affected with this condition. A unilateral nasal discharge is complained of, which is of an offensive character. It will be found that this discharge occasionally issues from the nasal cavity when the patient bends forward. It is somewhat intermittent, and entirely purulent. Odor is quite a characteristic evidence of abscess of the antrum of Highmore, and is sometimes the only subjective evidence of the involvement of the cavity. The odor is that of hydrogen sulfid. The odor is decidedly intermittent, and especially is this the case when we find no purulent discharge into the nasal cavity. I have had under my observation three patients who sought treatment solely on account of this unpleasant odor.

In none of the three cases above mentioned did I ever, during many inspections, see the slightest evidence of purulent discharge about the ostium maxillare or within the nasal cavity, although in all three cases there was antral involvement with cavities containing a small quantity of intensely foul pus. Slight septic infection may be manifested, as shown by chilliness, slight fever, and general loss of tone, with variable appetite. On inspection of the nasal cavity we will find that there is fine creamy pus in the vestibule, and running down from the ostium maxillare over the middle of the inferior turbinate body. If this pus issues from the antrum it is yellowish, semi-liquid; from the frontal sinus it is more likely to be shreddy, and to have its exit higher up than when it comes from the antrum. After cleaning away all the visible pus, if the patient is made to incline the head well down and slightly toward the opposite side, and to hold the head in this position for several moments, it will be noticed, on resuming the erect position, that fresh pus is issuing from the ostium maxillare.

It is not always an easy question, when we find pus issuing from under the middle turbinate, to diagnosticate which of the sinuses are involved. Fronts has suggested percussion of the maxillary sinus; dullness more marked over the one cavity indicates the one shown dull to be affected. In case of extreme doubt we are greatly aided through the agency of transillumination and exploratory puncture. In making use of the transillumination it is only necessary to have an electric lamp of sufficient candle power, which can be attached to a tongue-depressor, or even used free in the mouth, or one of the more appropriate antral illuminators, such as that devised by Heryng or Chevalier Jackson. In making use of transillumination it is an essential point that the room should be totally darkened. The lamp should be placed in the mouth, and the lips closed well down upon the holder of the lamp when the current is turned on.

The diagnosis of empyema of the antrum of Highmore results when the following conditions are shown under transillumination: Opacity of the cheek of the affected side, opacity of the pupil of the affected side, and absence of the luminous sensation in the eye of the diseased side. Puncture of the antrum by means of a trocar and canula is a comparatively simple test, and against which there can be no objection raised, especially if the symptoms, with the aid of transillumination, leave one in doubt. The puncture can be made through the inner wall of the antrum,—that is, from within the nasal cavity in the inferior meatus of the nose; through the outer wall of the antrum, the incision being made through the gingivolabial fold above the second molar tooth, or through the alveolus. After the puncture has been made the cavity is washed out, and the absence or presence of pus readily demonstrated. While transillumination often affords a most positive diagnostic physical sign in many abscesses of the antrum, yet it is well to bear in mind that it is not absolutely infallible, making errors not only of a positive, but also of a negative type. Some most excellent authorities claim to have no confidence in transillumination whatever, stating that it leads to so many errors that they can give no credence to its showings. These are the extreme negative diagnosticators, and I fear they are carried too far in their convictions. I have had a positive and a negative error showing in transillumination, both of which were errors in physical signs, as shown by subsequent operative procedure. In the negative case there was undoubted posterior ethmoiditis, and as a most brilliant transillumination of the antrum showed all the luminous points I felt convinced of the correctness of my judgment. Subsequently the antrum was opened, and pus was found therein. Dr. H. Holbrook Curtis, in the Transactions of the American Laryngological, Rhinological, and Otological Society, vol. iii, narrates a case of positive error showing in transillumination, in which at a subsequent period the patient was operated upon and the antrum found filled with a slowly growing osteoma, which was intruding into the orbit and the corresponding nasal fossa. A number of other cases could be collated bearing upon this point, but as it would lengthen out my paper too much and not prove more than I have here demonstrated, I shall not introduce them. Nevertheless, the few cases which have been noted form but a very small percentage of the cases in which transillumination has proved without error, and a great aid in clearing up dubious cases. Remembering this possibility of error, we have in transillumination one of the best and most unerring aids to the physical diagnosis of an abscess of the antrum.

Other conditions than disease of the sinuses giving rise to a purulent discharge from the nose, and from which this has to be differentiated, are purulent rhinitis of children, in which the discharge is bilateral; syphilis, in which the local and general manifestations are characteristic; foreign body, which is demonstrated by ocular inspection and palpation, and nasal diphtheria. Before closing up the subject of diagnosis I would like to interpolate here a never-before-mentioned reflex manifestation of antral abscess, and which, now that attention has been called to it, may be noted as a not infrequent reflex disturbance in this lesion. I refer to asthma as a reflex manifestation of antral abscess. In a paper which I read before the American Laryngological, Rhinological, and Otological Society at Cincinnati, June 2, 1899, I narrated two cases of this reflex disturbance due to the existence of abscess of the antrum, and which were relieved by the evacuation of pus from those cavities.

Prognosis.—A fatal termination of antral suppuration must be an exceedingly rare occurrence, though it is quite conceivable that such a termination could be brought about indirectly by involvement of neighboring cavities or sinuses, and thus extending to the cranial cavity. Septic infection could also produce a fatal termination. The recovery from an antral abscess, that is, the restoration to the normal, can generally be brought about, although the patience, ingenuity, and skill of the operator may be greatly taxed in many of his cases before such a favorable issue takes place. The time required to bring about resolution depends upon the cause, the duration of the abscess, the thoroughness of treatment, and many incidental factors.

Treatment.—I have very little patience with any line of treatment other than that which seeks to remove the cause, the conditions excited thereby, and restore the tissues to their normal state in the most expeditious manner possible. The spraying of detergent solutions into the nasal cavities and the washing of the antrum through the medium of a canula introduced into the ostium maxillare seem to me to be playing at a cure.

Growths within the nasal cavity or other pathological conditions tending to maintain the antral condition should be removed and combated. Diseased teeth should be removed. I wish to call particular attention here to the fact, as demonstrated by Grünwald in his work "Die lehre von der Nasenhohlen Eiterungen," that diseased crowns with perfectly healthy roots may not only produce this condition, but maintain the suppuration and prevent a restoration to the normal. I should therefore advise in those cases in which the healing is delayed, and for which there is no explainable reason other than neighboring teeth with diseased crowns, that the latter be extracted. I have also found on several occasions that extraction of neighboring tender teeth has demonstrated that their roots were diseased, and that the diseased conditions of these teeth were responsible for the prolongation of the suppuration, the removal being attended with a rapid resolution. The fronto-ethmoidal sinus should be carefully investigated in order to ascertain if they are normal, and when found diseased they should be attacked at the same time that the antral condition is meeting with your attention.

The causes under direct observation having been removed, we now turn our attention to the best manner in which the abscess can be drained, the cavity inspected and cleansed, and maintained free of pus, so that there may be brought about a rapid resolution. The three points at which the antrum can be opened for dependent draining is either through the alveolus, through the inner wall beneath the inferior turbinate, or through the outer wall in the canine fossa, or directly above the second molar tooth. Each operative procedure has its advocates; each advocate gives reasons why one particular method is better than the others.

In many cases, especially those due to diseased teeth, the alveolar method should be decided upon as the operation. All diseased teeth and roots should be removed, and a good, long, free alveolar opening made. I have ceased to consider teeth when I have a nasty antral cavity to combat, if removal of these teeth can in any way aid me in bringing about the cure of my antral abscess. The opening through the outer wall is especially to be considered when the teeth are perfectly sound, and seem in no way to have any causal relation to the pathological condition in hand. This operation is best done under general anesthesia. The gingivo-labial mucous membrane is incised at the point where it joins the outer wall of the maxilla. The incision should be an inch or more in length, parallel to the border. The mucous membrane and periosteum are now pushed back, and the surface of the bone broken through with the chisel or opened with a trephine. The wall is very thin at this point, and the opening is made almost immediately. An opening should be made, at least large enough to enable one to introduce the little finger. Considerable cellulitis is apt to ensue after the operation, but it usually subsides without unpleasant results.

The nasal method of operating seems to offer no advantages. The hemorrhage is apt to be very annoying during the operation, as well as at each subsequent treatment. The after-treatment must be more painful and more difficult than by either of the other methods, and cannot promise more. I must be frank enough to say I have never resorted to it.

The method of opening through the outer wall and then making a counter-opening below the inferior turbinate is a capital method of obtaining through-and-through drainage in very obstinate and taxing cases. After the cavity has been opened, by whatever method, it should be thoroughly washed out, and then subjected to a thorough and rigid exploration with either the little finger or with a probe. If necrosed or carious bone is detected, or projecting roots of neighboring diseased teeth should be exposed, they should be removed. Occasionally you will find ridges, partitions, or secondary cavities, which will have to be broken away or united. Growths you will seldom find, but frequently you will notice the mucous wall of the antrum to be in a condition varying from a minute granulation to an excessive villous state. Where we meet this latter condition the mucous membrane should be curetted, but extreme care should be exercised in carrying this out, and especial regard must be taken when working with the curette in the vicinity of the ostium maxillare. The antrum should be thoroughly irrigated again with a saturated boracic acid solution, and the cavity well but not tightly packed with iodoform gauze. The gauze can be removed after several days, the cavity well flushed out with the boracic solution, and repacked with gauze. This procedure must be repeated several times, when the gauze is finally left out; and if there is no further showing of pus in the daily cleansing, the cavity may be allowed to slowly close itself.

Unhappily, such a rapidly favorable issue as above outlined is not the rule. In most cases, several days after the removal of the gauze we find pus beginning to again appear in the water after irrigations. We must now be content for a time with frequent irrigations of boracic acid, permanganate solution, hydrogen peroxid, or formaldehyd. I have very little faith in and had absolutely no success with hydrogen peroxid. Besides the cleansing out of the cavity with these solutions, I inject into the cavity, after it has been thoroughly irrigated and dried, a solution of iodoform in benzoinal, occasionally alternating with five-grain solution of nitrate of silver. I find the Myle's irrigator by far the best. I inject the solutions through the medium of Anal's syringe. The use of the iodoform in suspension in benzoinal is preferable to the insufflation of iodoform, as the iodoform can be more uniformly distributed over the whole antral surface than can be done by insufflation.

Dr. W. Scheppegrel, of New Orleans, read a paper before the American Laryngological, Rhinological, and Otological Society at its annual meeting in this city, May, 1897, in which he strongly advocated the use of ozone in the treatment of obstinate cases of abscess of the antrum, claiming remarkably favorable results in the few cases that he had treated by this method. From verbal reports of several of my colleagues I have also heard good reports of the use of this powerful oxidizing agent.

The treatment of abscess of the antrum is not always a simple question, not always attended with a rapidly favorable issue. Ofttimes it will require great patience, both on the part of the patient and from you, before a favorable result is brought about. At times you will find that the flow of pus has ceased for several days, when, without any apparent reason, your patient has a relapse. Disappointment is very common to one who treats many of these antral suppurations, but patience, perseverance, and persistent, thorough treatment will win out in most of the cases that come under your observation.

Discussion.

Dr. B. Holly Smith, Baltimore, said the subject of the paper was of great interest, both to dentists and to rhinologists. These two branches of the profession of medicine often have need to confer with regard to these conditions. He had a friend, a rhinologist, with whom he frequently consulted, to the benefit of each. He thought that there was frequently excessive use of strong antiseptics in treating antral diseases. It is reasonable to suppose that these strong solutions applied to the mucous lining of the antrum would be irritating, and probably exaggerate the conditions they were meant to relieve. It is much better to temporize in many cases, opening up the cavity and emptying it of the pus, and washing it out with a wash of a mild character, and then give the case a chance to get well.

We must not expect to be able to effectively drain the antrum through a small puncture. The author of the paper rightly advises that a large opening should be made, so that the cavity may be thoroughly washed out and drained. He thought that rhinologists as a rule were not as well equipped as were dentists, as the trephines used with a dental engine were better adapted to open the antrum fully than chisels or other cutting instruments.

Dr. H. C. Thompson, of Washington, agreed with the paper in almost every item, but did not agree that there was a regular point where the puncture should be made in every case. We must recognize the fact that there are changes going on in the antrum with the advancing age of the patient. In connection with Dr. Cryer's paper, published in the Dental Cosmos, he had made considerable investigation to find the most dependent part of the average antrum. There is a great deal of variation, according to the age. If the teeth remain in the jaw the change is not so great, but when they have been lost for some time the most dependent point will be found to be much farther forward than it is in a younger patient. He thought that a second attack was often brought on by the treatment of the first attack. The character of the pus that appears when the cavity is opened will indicate the treatment necessary. A large majority of all cases are due to caries of the teeth, and if the diseased teeth are left in place we invite a repetition of the trouble.

Dr. G. H. Claude, Annapolis, Md., spoke of a case of his in which a tooth was treated and filled without knowledge that there was antral trouble. Afterward the tooth was extracted, the opening in the antrum found and enlarged, and the antrum washed out with the permanganate of potash, and then packed with a preparation of bismuth. It seemed for a while to be cured, but broke out again and again. He noticed that the periods of exacerbation followed a period of spree. In this case the removal of the tooth did not remove the cause of the inflammation of the antrum, because it was constitutional.

Dr. Richardson, closing the discussion, said that Dr. Smith was mistaken in thinking the rhinologists did not make use of the trephine. In opening through the outer wall they use a chisel, but otherwise a trephine run by electric motor.

The subject was passed, and the following paper read by A. D. McCONACHIE, M.D., of Baltimore, Md.:

WHAT SHALL WE EAT AND DRINK? HOW? AND WHEN?

The philosopher, Feuerbach, spoke truly when he said, "Man is what he eats." This axiom should be made to embrace what he drinks. Theoretically, this truth is widely appreciated, but very much neglected in every-day practice; not only by the unprofessional, but by physicans. Eating too much, or unsuitable food at unsuitable times and manner, is the chief cause of the host of discomforts called by various names,—indigestion, biliousness, dyspepsia, heartburn, etc. Doubtless more suffering is caused by avoidable errors in eating than by the use of alcoholic beverages, enormous as the latter is.

Our food-supply and mode of using it having, then, so much to do with individual health and length of life, let us take a survey of its essentials. A rational system of dietetics should begin with the children of the rising generation in order to fully understand its influence on growth, development, and health. In attempting to reform confirmed transgressors our efforts are largely misspent, and a fair test of its merits cannot be had.

We cannot overestimate the importance of a properly regulated diet. It is essential to maintain perfect health, to prevent disease, and to help nature to cure disease when once established. This, to me, is one of the most important subjects connected with the science of medicine, the perfect regulation of diet most conducive to the above conditions. Our greatest possibilities for success, medical and surgical, lie in the successful regulation of the diet. Hence we should be complete masters of its details if we are to cope successfully with the problems of health and disease. Therefore, we should have exact physiological knowledge and a clear conception of the chemical composition of all food-stuffs, their capability of digestion, and the mode in which they are appropriated by the animal economy.

Let us briefly review some important physiological facts and the process of normal physiologic digestion before going into the details of the various foods and drinks.

The body is an aggregation of cells, each cell a minute mass of protoplasm which has the property called life, life manifesting itself by various functions, as reproduction, nutrition, growth, etc. Each cell, therefore, has a life history of its own. It grows, fulfills its mission, produces other cells, wastes away, and dies. In its life processes waste is created, hence the necessity of food-supply, or existence would cease. If the food-supply equals the waste, there will be no apparent change. If the supply is less than the waste, existence may be prolonged, but must finally cease; if it exceeds the waste, there will be an increase in growth. To keep the body in perfect condition the quantity and quality of food should be such as best supplies that which is worn out. Nature furnishes the infant at birth the food-milk, which is typically perfect. The infant finds in milk all the various elements necessary for sustaining life, growth, and upbuilding of the tissues in the right proportions. Other foods may be successfully substituted if we keep in mind the exact composition of the typical food furnished by nature. A knowledge of physiology will enable us to select that kind of food which is demanded by the age, condition, and temperature.

The first step in physiologic digestion is the mastication of food; thus the food is comminuted and admixed with saliva and mucus; the carbohydrates, as bread, mush, potatoes, etc., are thus partially digested, changed into sugar, moistened, and thus rendered more easily swallowed.

The next important chemical process goes on in the stomach, where it encounters the gastric juice,—hydrochloric acid, pepsin, and rennin,—and the proteids are transformed, at least partially, into peptones after passing through various preliminary stages; the muscular movement of the stomach facilitating the process by its churning action, and propelling the contents into the duodenum for further digestion. Very little absorption takes place from the stomach. In the duodenum the food comes in contact with the pancreatic and biliary secretions, which complete the digestive processes in the proteids, starches, and fats.

These chemic changes completed, the converted food is absorbed by the circulation and the lacteals; the *débris,* or indigestible portion, passing into the colon forms the body of the feces.

The entire alimentary tract is the haunt of various forms of bacteria, some of which give rise to fermentation and putrefaction. These are carried down with the food.

All food-stuffs are derived from either the vegetable or animal kingdom, the latter coming primarily from the former. Foods are usually divided into organic and inorganic, a very convenient subdivision being to divide the organic into, first, nitrogenous; this includes substances consisting of proteid, as albumen, casein, myosin, gluten, fibrin, legumin, etc.; second, non-nitrogenous, further divided into (1) amyloid and saccharine bodies, usually called carbohydrates, as starches and sugars; (2) oils and fats, substances containing carbon, oxygen, and hydrogen, the oxygen being less in amount than in the carbohydrates. Inorganic foods are those which furnish the system with the required salts and water. It then makes little difference whether foods come from the animal or vegetable kingdom, as they all contain three classes of chemical substances, water and the inorganic salts; the heat and energy producers, as starch, sugar, and fat; and the proteids, tissue-builders.

In dietetic literature we find many misleading statements, due largely, I think, to a faulty knowledge of the chemical composition of foods. The opinion that the vegetable class contains only starch, sugars, water, and salts, to the exclusion of proteid elements, largely prevails. This is a mistake, for it is well known that all vegetable foods contain a goodly proportion of the proteid class. Again, some think that the animal class is composed purely of proteid substances. These opinions and statements are misleading. The truth is that all food, whether vegetable or animal, contains all three classes of chemical elements,—water and salts, the heat producers, and the muscle-forming materials,—but the relative proportion varies.

Sugars and starches are always found in excess in vegetables; fat is always in excess in the animal as compared with the vegetable food. Therefore the selection of a dietary does not lie in excluding any one class of foods,—*e.g.,* becoming carnivorous or herbivorous,—but to unite the two in our dietary so that we may secure the proper quantity of the inorganic matter of the sugars, starches, fats, and proteids, and yet not have an excess of the one group as compared with the other.

The utility of the three classes of foods in the economy should be borne in mind. The proteids are the true tissue-builders. They enter the alimentary canal as animal or vegetable proteids, and are there transformed into peptone, after passing through various stages from alkali-albumen to acid-albumen, to albumoses and peptone, a condition necessary before it can be taken up by the epithelial cells lining the alimentary canal; only a portion of the proteid material, possibly one-third, is so changed in the stomach, the remainder passing into the duodenum, there to be acted upon by the trypsin of the pancreatic secretion and the proteolytic ferments of the bile and intestinal secretions. The peptone being taken up by the epithelium of the intestinal wall, it is altered by them and passed on to the entero-hepatic circulation; not as peptone, but as serum-albumin, serum-globulin, or fibrinogen. In normal conditions peptone as such is not found in the entero-hepatic circulation. After these proteids are passed on through the liver they are taken up by a process of absorption and changed to form the various tissues and glands of the body. Water and the inorganic salts are purely mechanical in their action as they pass through the system, entering and leaving the system unchanged in composition. Starches, sugars, and fats are readily oxidizable, and are easily changed within the system. The sugars, those taken in as such, and starches converted into sugars, are oxidized in the liver cells into carbon dioxid and water, with the development of heat as a product. The heat thus generated reflexly stimulates the nervous system. Fats are oxidized, being first emulsified and saponified and absorbed, in the pulmonary circulation, giving rise to heat, which again stimulates the cerebro-spinal nervous system.

It is from the proteid class that all the damaging toxins of food arise.

We have thus noted the composition of food-stuffs; let us now look at the digestibility of animal as compared with vegetable food. It has been indisputably proven by experiment that animal foods are more easily digested than vegetable, milk, eggs, and beef being the most readily so of all foods in use, with a minimum of residue (three to six per cent.) remaining undigested. Hence in health or disease these are the most valuable foods. From twenty to seventy per cent. of all vegetable food passes through the alimentary tract undigested. The vegetable foods more readily undergo fermentation and putrefaction. Our preference, therefore, from a digestive and non-fermentative standpoint, should be in favor of animal foods.

In selecting our foods we should also bear in mind to secure the salts and water,—heat producers and tissue formers,—in proper proportions. We find this proportion more nearly perfect in the animal food. In milk we find the proportion perfectly arranged for infant life. In youth and adult life, when employment and much activity is required, we need to increase the tissue-forming food,—the proteids,—hence bread and butter must be added to make it approach the proper proportion of constituents.

The strong objection to animal food is that it is defective in nucleo-albumin, an essential element in the composition of red blood-cells and for the supply of lecithin to the nervous system. Therefore an exclusive animal diet is apt to produce an anemic condition; therefore some cereal food should be added to the animal diet to supply the nucleo-albumin which gives to vegetable food its chief advantage, beside which its bulk gives the intestine something to contract upon.

The great disadvantage of the vegetable foods lies in the quantity of starch and sugar they contain. This undergoes fermentation and putrefaction, with formation of innumerable toxins to be absorbed into the circulation.

It is then evident that we cannot consider the vegetable or animal foods alone as ideal foods. We must blend the two to secure the proper proportion of the three classes of food required.

We, in contrast with other nations, are called a nation of dyspeptics, due largely to the American tendency to live largely upon vegetable food, including fruit, and rich and highly-seasoned dishes. This error is responsible for the origin of seventy-five per cent. of our diseased conditions. The excessive use of fruit, raw, cooked, or preserved, for its so-called laxative effect is a serious error in our dietary. True fruit is laxative, but not due to its biliary stimulation and an increased production of glycerol and soap in the intestinal canal, but to its fermentative and putrefactive action; hence acts as an irritant and causes its expulsion through increased intestinal peristalsis, and the patient is deluded because his bowels are moving freely; the putrefaction and fermentation increasing, producing toxins to be absorbed and work their damaging effects upon an already damaged nervous system. Not only the excessive fruit-eating propensity is disastrous, but our irrational method of taking fruit is in defiance of physiological teaching. The breakfast at hotels and in most private families begins with fruit, usually very acid kinds, as apples, oranges, grape fruit, grapes, etc., followed by some sort of cereal, mush, farina, wheatina, etc., washed down with milk or cream, and with scarcely any admixture of saliva, whose ptyalin should at least partially dextrinize the starch in the mouth. Saliva is the only fluid that digests starch until it reaches the intestines. The digestion of starch in the stomach is retarded or arrested by very small percentages of acids, either the normal stomach acid, hydrochloric, or organic acids derived from fruits; the former, according to Ewald and Boas, arresting starch digestion by twelve per cent. presence and retarding by .07 per cent. Chittenden says that .003 per cent. stops starch digestion. The organic fruit acids, according to Ewald and Boas, are credited with a decided power of inhibiting the digestion of starch in the stomach, though less than that of hydrochloric. Fruits, then, when eaten should be eaten alone, or at the end of a meal, when starch digestion has been partially completed. Condiments and highly-seasoned articles of food can be considered in their effects and uses in the same category as stimulants in general, as tea, coffee, and alcoholic beverages, which we will now consider briefly.

It is generally conceded that tea and coffee in immoderate quantities impair digestion, and slowly produce abnormal digestive and absorptive processes. This is largely due to the stimulating principles therein, thein of tea and caffein of coffee, combined with the deleterious action of the contained tannin on the mucous membrane. Excepting for the water and salts ingested in tea and coffee drinking, the food value is practically nil.

Regarding the food value and digestive effects of alcoholic beverages there is quite a wide divergence of opinion. Formerly it was the prevailing opinion among physicians that alcohol in moderate amounts was a food and aided digestion, but the careful, painstaking, and accurate investigations of recent years have demonstrated the fallacy of that opinion; and at the present time the majority of physicians who have made a careful study of the subject are convinced that alcoholic beverages not only do no good, but are positively injurious to digestion, absorption, assimilation, and oxygen-carrying power of red blood-cells. Dr. Chittenden says, "One tablespoonful of whiskey, fifty per cent. alcohol, reduces digestive activity seventy-five per cent." Dr. Richardson, of the London Temperance Hospital, says, "Nothing more effectually hinders digestion than alcohol." Dr. Kellogg says, "Nothing could be farther from the truth than the popular notion that alcohol, at least in the form of certain wines, is helpful to digestion." These and many more opinions of similar import could be quoted to prove that alcohol not only has no food value, but seriously retards digestion, especially the proteids, and thereby seriously impairs the nutrition of every tissue and cell of the body. The muscular power is reduced, mentality is interfered with, the special senses are reduced in acuity and activity; hearing reduced, acuity of vision lessened, the sense of taste obtunded, the sense of smell blunted, the pain, heat, and touch senses materially impaired.

What, then, shall we eat and drink? From birth on, the diet should be carefully regulated, always keeping the animal class of food in excess of the vegetable, adding sufficient of the latter as soon as it can be tolerated by the digestive apparatus. It is an every-day experience to see infants who have thriven upon the breast milk or modified animal milk during their first year suffer much from digestive disturbances when that period has passed, largely due to adding to the dietary, under the false impression that the breast milk or artificially prepared milks are no longer nourishing enough, pure milk, crackers, porridge, potatoes, and bread. This will, if persisted in, produce chronic intestinal indigestion. During the second year the child does not need the large proportion of carbohydrates it receives in earlier life,—that is, six of carbohydrates to one of proteids,—as it is not able to digest and assimilate them if given in large amounts, as farinaceous foods. The child in its second year requires more nitrogen in proportion to other food elements than in its first year. Potatoes should not be given till the end of the second year, and then only baked. Potatoes and oatmeal are the most potent factors of indigestion at this age. All farinaceous food should be secondary in the diet of a child until it has shown a capacity to digest them, usually at the end of the second year.

During the developmental period great care should be exercised, as the child will preferably indulge more and more in the vegetable food to the exclusion of the animal class, which goes for proper tissue-building, thus laying the foundation of various diseased processes, as tuberculosis, etc.

When adult life is reached we should not relax our vigilance and allow intemperance in dietary to reign, as too liberal indulgence in vegetables, fruits, and alcoholic beverages, thereby giving rise to retrograde products of metabolism and toxins, the result of putrefaction and fermentation in the intestines, and thus engraft disease upon the system. Therefore the diet should be composed principally of milk, eggs, meats of all kinds, including fish, poultry, and game, excluding veal and much pork of any kind. With this include liberal amounts of well-cooked bread, plenty of good butter, and a limited amount of vegetables, chiefly rice, peas, string beans, spinach, lettuce, and macaroni, excluding much potatoes,—never sweet,—and eat sparingly of other forms of vegetables. Avoid all fried forms of food, bonbons, confections, pastries, cakes, and rich desserts. Fruits should be used as already outlined. As to drinks, the first requisite is pure water. Man can live many days on pure water alone, as seventy per cent. of the body is made up of water. The water should be taken preferably at about the temperature of the body, and not according to the peculiarly American habit, as ice water and in large quantities. The taking of ice water retards digestion, both by lowering the temperature of the stomach contents and by a dilution of the gastric juice. It is also capable of damaging seriously the delicate mucous membrane, and finally causing catarrhal inflammation of the stomach and intestines in people otherwise predisposed to that affection. Water is better before, after, or between meals, and not swallowed with each mouthful of food. A quart of fluid is sufficient for the needs of the day. Milk, being largely water, can be considered an efficient substitute for water, having at the same time nutritive value. If it be not well borne as milk some modification thereof, as buttermilk, skim milk, junket, koumiss, kefyr, may be tolerated. It is preferably taken alone, with no other food, and warm, say one hour before meals. For reasons already given, if we are to maintain the highest perfection of nutrition and digestion we should avoid all alcoholic beverages, tea, coffee, and soda fountain drinks. The individual by following religiously, rigidly, and rigorously this outline of dietary will easily cope with the harassing struggles of life, maintain health, and ward off disease. By neglect of these rules the individual will sooner or later cry out, "My stomach must be out of order." "Everything I eat sours on my stomach." "I am sick at my stomach all the time." "I am all used up." "I must be bilious." "My liver must be out of order." "I must have malaria." On further questioning other symptoms are given, as eructation of gas, with or without a bitter, sour taste, accompanied by epigastric pain, relieved by belching; palpitation and pain over the heart region, headache or a feeling of uneasiness about the head, a feeling of languor; the tongue is coated, nausea may be frequent, bowels may be loose, and diarrhea complained of. Sleep does not refresh, and the patient feels worse after sleeping. The individual becomes irritable, and trivial affairs cause much worry. Inability to concentrate the mind and a desire to be left alone is common. The appetite may be impaired or aggravated.

In looking for the cause in any case, we usually find the trouble to be due to one or more of the following causes: Rapid eating, improper food, eating when fatigued, use of alcoholic beverages, tea, coffee, or soda water drinks, too severe exercise after eating. The treatment of such condition is largely dietetic. Medicine is of secondary importance, and an aid for only a short time, overcoming the faulty digestion then existing. We must correct the underlying cause. Defective teeth should be repaired; indulgence in tea, coffee, and alcoholics forbidden; too rapid eating corrected; eating too frequently at irregular times abandoned; eating when fatigued or exercising too soon after a meal forbidden. By exercise I do not mean the walk to and from business, but long walks, riding the wheel, or severe mental exertion.

Avoid foods as follows: Those containing much cellulose, as the coarser vegetables, skins of fruits, etc.; also those containing an excess of fat or prepared by the aid of fat, as fried foods, gravies, made dishes, sauces, and, generally speaking, those foods designed to please the palate without having any decided nutritive value. Sweets are to be avoided; oatmeal and other farinaceous food as commonly eaten, with sugar and cream, are especially pernicious, and liable to undergo fermentation. Avoid eating at any time simply for the palatability of it; that is, at times when the stomach and intestines have not gotten rid of the previous indulgence. Briefly, impairment of nutrition and digestion is avoided by correction of bad habits of eating, the use of proper foods, and the eating at proper times, with the regulation of time and quality of drinks. Medicinal treatment is useless without proper dietetic management.

This *résumé* of what we shall eat and drink, how and when, has been suggested from a long-drawn battle, over which I have been the victor by following the details given above. For years impaired digestion and nutrition have been my greatest enemy; not to be annihilated by persistent medication, but finally succumbed by judicious, wholesome, temperate methods of living.

These truths have been gleaned from careful clinical and experimental observation on myself, aided by the researches of others. Trusting that I may have said something which will, if followed, either prevent the development of gastro-intestinal derangements and its attendant consequences, or assist those who are already afflicted to again come within the pale of the realm of health and happiness; if so my effort will not be in vain.

Discussion.

Dr. B. HOLLY SMITH, Baltimore, agreed with the essayist that the evils of intemperance in eating were quite as serious as those arising from intemperance in drinking. Not that the former were so liable to lead a man to murder his mother-in-law, but they were of such a character as to shorten his life and give his wife an opportunity to seek a second partner.

He proposed a vote of thanks to Dr. McConachie and to others who were not members of the societies who contributed papers.

The motion was put and carried unanimously.

Dr. R. OTTOLENGUI, New York, asked Dr. McConachie whether distilled water was considered good to drink.

Dr. MCCONACHIE said this was a question not definitely decided. It was thought by some that in distillation the water was robbed of something that was necessary to our well-being. What it was he could not say.

Dr. OTTOLENGUI said that he used distilled water for drinking; that is, he used Poland water. A few evenings before he left home he had had company, Dr. Morton and a distinguished dentist of New York city. He brought to them a siphon of Vichy, and the subject of water for drinking was thereby brought before them. Dr. Morton said he drank plain water from the spigots. He said the food he ate was not all used to nourish his body, but the waste and possibly harmful ingredients are cast aside; so he believed the impurities in the water would be passed from the system without injury. He believed distilled water to be harmful, as it was deprived of its salt and probably of other materials necessary.

Dr. MCCONACHIE said the subject of food was the fundamental principle on which the practice of medicine and dentistry as a branch of medicine should be built. A dentist is not equipped to practice his profession who does not take the knowledge of the whole human system as the basis of his practice. He cannot otherwise follow his profession as it should be followed at the end of the nineteenth century.

He was a graduate of dentistry and of medicine, and in the practice of his specialty of diseases of the eye and the ear his knowledge of dentistry was often of value to him. There were many cases of men who could have a considerable error, for instance in the focusing apparatus of the eye, without experiencing serious trouble, but if to this was added nerve irritation from dental troubles the consequence would be headache and a general nervous state which might be very serious. In the same way a man who is suffering from the want of elimination of the waste products of his food will be more likely to have trouble with both eyes and the teeth than if his digestive and secretive organs were normal. We can only overcome such trouble by nourishing the little cells whose office it is to eliminate these waste products. He did not believe the theory that microbes cause all diseases, but we know that certain diseases are so caused; yet not near all who are exposed to these microbes suffer from the diseases, because in most cases the system is immune from their attacks. In regard to drinking water, he thought the best was water that had been heated to the boiling point. This destroys the harmful microbes.

The subject was passed, and Dr. OTTOLENGUI, of New York, described a method and the materials used in porcelain fillings.

He said that glass inlays came first in the history of the class of fillings, but they were unsatisfactory because of want of strength and because they shrunk in cooling; and a method had been sought that would furnish an inlay of porcelain that could be fused in a matrix of gold foil. Platinum was objectionable because it was impossible to make the matrix conform so exactly to the shape of the cavity. Dr. Jenkins, of Dresden, adopted a high-fusing glass. This did not shrink much, but, though it was made in a gold matrix, it was unsatisfactory because it was liable to crack. Dr. Jenkins made a search over the porcelain works of Germany, and at last found a porcelain that could be fused in a gold matrix and then ground and polished like the Ash body. This material was in a high degree satisfactory, but was, especially in this country, very expensive, costing so much that dentists could not well afford to use it. The Consolidated Dental Manufacturing Company, of New York, had a material, however, which he described as quite as good or better than Dr. Jenkins's, which was sold at a much lower price. (At the clinics Dr. Ottolengui demonstrated the use of both materials.)

The subject was passed, and the convention adjourned till morning.

(To be continued.)

MINNESOTA STATE DENTAL ASSOCIATION.

THE sixteenth annual session of the Minnesota State Dental Association was held at Northfield, July 25, 26, and 27, 1899. The following officers were elected for the coming year: Dr. W. N. Murray, Minneapolis, president; Dr. J. N. Walls, St. Paul, vice-president; Dr. H. L. Cruttenden, Northfield, secretary; Dr. H. N. Reid, Minneapolis, treasurer. Executive Committee, Drs. F. H. Orton (chairman), St. Paul; A. Oure, master of clinics, Minneapolis; J. W. Penberthy, Minneapolis; C. N. Jones, St. Paul; A. C. Searl, Owatonna. Membership Committee, Drs. E. G. Riddell (chairman), Northfield; A. C. Rosenquist, St. Peter; C. N. Nutting, Spring Valley; J. B. Little, St. Paul; O. A. Weiss, Minneapolis.

The next meeting will be held at Minneapolis, or at one of the lake hotels at Minnetonka; date to be fixed by the Executive Committee.

H. L. CRUTTENDEN, *Secretary.*

DENTAL SOCIETY ANNOUNCEMENTS.

INTERNATIONAL DENTAL CONGRESS.

THE National Association of French Dentists have organized an international congress to be held, under the patronage of the French Government, during the Universal Exposition of 1900. Similar congresses were held during the Paris Exposition of 1889, and at the Columbian Exposition at Chicago in 1893. The principal dental societies of the entire world will be represented. The date has been fixed to the seven days from the 8th to the 14th of August, 1900, immediately following the two important congresses,—Medical Ethics (practitioners) and the Medical Congress proper.

The work of the Dental Congress will be divided into eight sections:

First. Anatomy, Physiology, and Histology.
Second. Special Pathology and Bacteriology.
Third. Operative Dentistry and Special Therapeutics.
Fourth. General and Local Anesthesia.
Fifth. Prosthesis, Dental Orthopedia, and Facial Restorations.
Sixth. Teaching and History of the Dental Art.
Seventh. Legislation, Jurisprudence, and Professional Ethics.
Eighth. Hygiene, Public Dental Service.

Two sorts of communications will form the matter of discussion of the congress: first, those received in advance by the committee, for the preparation of reports in each section; second, subjects chosen by the authors (the latter papers may be written in French, English, German, Russian, Italian, or Spanish,—only the conclusions must be in French). There will also be practical demonstrations by operations either of operative dentistry or of dental prosthesis, and the exposition of new instruments.

The conditions of membership for the congress are the legal right to practice dentistry, honorable exercise of the profession, and the recommendation of the National Committee. The Organizing Committee will also consider the applications of persons not exercising the profession. Members who desire to present communications to the congress should give notice to the secretary-general at least three months before the opening of the congress. With this notice they should send the text of the conclusions which sum up the paper; these conclusions will be translated into French by the committee.

The subscription for membership is twenty-five francs, giving a right to all the privileges of the congress. Subscriptions should be sent to the treasurer, M. Viau, 47 Boulevard Haussmann, Paris. Communications are to be addressed to the secretary-general, M. le docteur Sauvez, 17 Rue de Saint-Petersbourg, Paris.

FOLLOWING is the Japanese Central Committee of Organization:

MM. E. Obata, honorary president; K. Takayama, president; M. Aoyama, S. Enomoto, Dr. M. Ichinoi, Dr. S. N. Isawa, Dr. T. C. Suganuma, S. Tomiyasu, vice-presidents; Dr. Louis Ottofy, secretary; M. Araki, treasurer.

PENNSYLVANIA BOARD OF DENTAL EXAMINERS.

THE Pennsylvania Board of Dental Examiners will conduct examinations simultaneously in Philadelphia and Pittsburg, December 18, 19, and 20, 1899.

Application for examination must be made to the Hon. James W. Latta, Secretary of the Dental Council, Harrisburg, Pa.

G. W. KLUMP, *Secretary,* Williamsport, Pa.

EDITORIAL.

TOOTH-CARIES AND PUBLIC HEALTH.

WE are so constantly reminded by those of limited opportunities for observation that early decay of teeth is a peculiarly American state of affairs, that the world at large seems to have come to regard it as a settled fact. It is highly probable that the development of the tendency among the masses of the American people to seek the services of the dentist in the care and restoration of defective teeth, the extent of public appreciation of the need for dental services in the saving of teeth, and the concomitant growth of dental practice and technique in this country have intensified the general belief that the teeth of Americans are more subject to decay than those of other nations. Writers accepting the popular verdict as to the poor teeth of the American people have presented many ingenious hypotheses to account for it. Heredity, race mixture, sweets, extremes of temperature in foods, the inordinate use of ice, ice cream, and cold drinks, etc., have all been offered as contributory factors in the production of the disease. Facts are being gradually brought to light which indicate that early decay of the teeth is a peculiarity not wholly monopolized by the American people, if indeed they can show the highest average of defect in that regard.

Through the energy of Dr. George Cunningham, of Cambridge, England, a system of inspection of the teeth of British school children has been instituted, and the figures from time to time elicited from that source as to the prevalence of tooth-caries are somewhat surprising. Interest in the subject thus awakened has been growing in England perhaps more rapidly than elsewhere, at least in its bearing upon the question of public health.

In the *British Medical Journal,* September 2, is published a paper by James Cantlie, M.B., F.R.C.S., surgeon to the Seaman's Hospital Society, and read before the British Medical Association, in which the author in vigorous terms calls attention to the prevalence of decay of the teeth among the school children of Great Britain.

His interest in the question has been aroused by personal observation and a study of statistics based upon scientifically conducted investigations, which leave no doubt in his mind as to the prevalence of the disease in question. He views the problem as one of national importance to Great Britain, and says, "We cannot expect to rear a healthy race on carious teeth, and it is to try to stem an evil which is sapping our national strength that I would seek your attention now."

He reviews somewhat at length the various causes which have been assigned for the prevalence of early tooth-decay, and dismisses briefly the suggestions as to the cause which numbers of interested persons have furnished, as he finds scarcely any two that agree. Sweets and artificially prepared infant foods, the too early use of animal food, evolutional degeneracy, rickets, gout, etc., are among the suggested causes discarded by the author.

He also denies the possibility of the developmental idea,—that is, that in our quest after education we are attracting a superfluity of blood to our brains and thereby starving our teeth and jaws. He says, "The future of our teeth in common with the general state of our adult physique depends largely on the care taken of the infant during the first two years of life. The future of our teeth is laid before the child has begun to use its brain; and not only is this true of the milk teeth, but also in regard to the permanent, and one may fairly gauge what the state of the permanent teeth is to be by the state of the development and shape of the jaws at that period."

In the light of modern investigations of the etiology of dental caries, the foregoing statement must be regarded as somewhat sweeping. It is undoubtedly true that the structural characteristics of the teeth are largely determined at the period alluded to, but they are by no means completed, and the author's generalization wholly disregards the essential etiological factor which is the exciting cause of dental caries,—namely, that of bacterial influence. The only reference to the bacterial factor is by implication, when he says, "Another phase of the developmental theory is that our jaws are getting smaller, leaving less room for our teeth. The teeth, therefore, it is contended, become overcrowded and overlap, leaving nooks and recesses in which particles of food may find shelter, setting up decomposition, eroding the enamel and leading to caries of the dentin." He however dismisses the suggestion by saying that "This is stating an actual condition whilst begging the cause."

He makes an eloquent appeal to the dental profession for more light upon the prophylactic side of dental study. He says, "The dental art has attained so high a position in this country and in America that, so far as the mechanism of the art goes, there is but little more to be done. But I would like to induce our dental brethren to look a little farther afield and tell us how to rear the child so that the teeth while yet unerupted and within the dental sacs may be allowed to grow to the greatest perfection. It is not only when the teeth are through that I would ask the dentist's aid; it is to a period when the basis and substance of the tooth is being formed that I would wish him to direct his attention. If dentistry is to aspire to its highest ideal, it must not be content with repairing or removing damage done. We look to it to tell us why do our children's teeth decay so early, and what steps are we to take to remedy the evil, so that sound teeth in the young may be hoped for.

"It is during the period of growth and development, during the antenatal stage perhaps, or at any rate during the first few months of infant life, that we must look for guidance and correction. We want to know what error of diet or mode of living on the part of either the mother or the child fills our children's mouths with painful stumps and festering abscesses."

Well, in the name of the dental profession, we may answer, "So do we." Throughout his highly interesting communication, the author has ignored several important facts: first, that in their aspiration toward the highest ideal his dental brethren have for a long time been addressing themselves to precisely the same problem in which he has just now shown such an active interest, and in their effort to attain that ideal they have, as a matter of fact, gone so far as to demonstrate beyond reasonable doubt the exact nature of the process by which caries of the teeth is produced.

We know to-day, and have known for some years, how teeth decay. The question why teeth decay, which after all is the problem under consideration by Mr. Cantlie, is one which so intimately concerns the work of the hygienist and physician that it seems hardly fair to throw upon the dental profession the whole responsibility for its solution. The problem which the author desires his dental brethren to answer is the one which is the essence of pathological study and investigation at the present time in all of its departments,—namely, the question of susceptibility and immunity,—and until those best equipped by education and opportunity to throw light upon this fundamental problem of pathology have given us its rational explanation we cannot hope to furnish an adequate answer to the special inquiry of "Why teeth decay." Nevertheless, as the "how" of the problem has been answered by the dental profession, it is not altogether impossible that they may in time also elucidate the "why."

Mr. Cantlie is dealing with a very complex side of the question,—namely, the predisposing causes of dental caries. He is undoubtedly right when he calls attention to the importance of improper diet, artificial feeding, abnormal temperature of the food, the use of that popular abomination of infancy which he calls the "Comforter," an India-rubber teat given to the infant to suck in order to keep it quiet, but which he justly regards as productive of a long series of evils resulting from the malformation of the jaws and dentures which its habitual use engenders, not to mention the risks of disease due to infection by its unclean surface; but all of these are probably details in the whole cycle of influences which tend to depress the *vis vitæ* of the infant organism, reducing its resistive power and rendering it relatively susceptible to the invasion of pathogenic organisms, including those which are the exciters of dental caries.

We are glad to note that the energetic presentation of the subject made by the essayist took practical form in a resolution as follows, which was unanimously carried: "That, in view of the early decay of the teeth prevalent in Great Britain, this section requests the Council of the British Medical Association to appoint a committee of not fewer than three persons to inquire into the subject and report thereon to the Council twelve months from the date of appointment."

It is regrettable that the resolution did not provide for a commission specifically constituted as originally suggested by Mr. Cantlie, —namely, that the commission should consist of "two dentists and a physician, men who are versed in children's ailments, and possessing the scientific attainments necessary for such work." It is to be hoped, however, that should the commission be appointed it may be constituted as originally suggested by the mover of the resolution, in order that what has been done in the scientific investigation of this important subject by the dental profession may not be overlooked or fail to receive its due weight of consideration in the report to be made of the work of the commission.

THE INTERNATIONAL DENTAL CONGRESS, PARIS, 1900.

At a meeting of the Executive Committee for America, held in Chicago, October 14, 1899, a communication was received from the Committee on Transportation, announcing that they were actively completing arrangements for reduced excursion rates, and will shortly be able to make definite rates covering several classes of excursions, which rates will prevail throughout the summer.

The arrangements will be such that all reputable American practitioners desiring to attend the Congress will be enabled to do so under most favorable conditions.

Work upon the official program for America was practically completed, and the Executive Committee will shortly be able to announce the appointments in full.

THE AMERICAN DENTAL SOCIETY OF JAPAN.

We are in receipt of a copy of the Constitution and By-Laws of the American Dental Society of Japan, organized in Tokio, Japan, June 3, 1899.

The society is made up of active, associate, and honorary members, who must be graduates of reputable dental colleges in the United States, and who reside and practice their profession within the empire of Japan.

The meetings are held monthly, excepting in July and August. At the meeting of organization the society only elected a president, Dr. Louis Ottofy, of Yokohama, and a treasurer, Dr. T. C. Suganuma, of Tokio.

The election of other officers was postponed to a subsequent meeting.

BIBLIOGRAPHICAL.

Chronic Alveolitis. Pyorrhœa Alveolaris, Phagedenic Pericementitis, Riggs's Disease, etc. Its Causes, Clinical History, and Treatment. With General Directions for the Care of the Teeth. By Dr. Henry S. Nash, New York. New and revised edition, in two volumes. Volume I. F. Schleuning, Publisher, Stuyvesant Square, New York, 1899.

We gave this publication a critical and lengthy review in the Dental Cosmos of October, 1897, about the time of the appearance of the first edition. The author has since revised the work considerably and eliminated a number of textual errors which marred it at that time.

In our first review we called attention to certain features in the book which we regarded as misleading, and which detracted from its usefulness as an exposition of the complex disorders of which it treats.

We fail to see in this revised edition that the main grounds for our criticism have been removed or even modified. In the first place, the author's tendency is to base his classification of the varieties of this disorder upon its clinical aspects rather than upon the etiology of its several forms. In fact, the generic term which he prefers to apply to all varieties of the disease indicates the same tendency. He says, "Alveolitis is the predominating clinical feature with every type of the disease by which teeth become loose in their sockets from the loss of their alveoli, except as will be mentioned. It seems reasonable therefore to make use of it here generically in preference to any other of which I have ever heard." Granting it to be a fact that alveolitis is a concomitant condition in all cases of loosening of teeth by the disease under consideration, it is nevertheless true that the alveolitis is not the cause of the disorder, but a consequence, which latter fact is demonstrable by the inevitable arrest of the associated alveolitis when a tooth affected with phagedenic pericementitis is removed by extraction.

As to the infectiousness of the disorder, the author says it is not infectious in the ordinary sense of the word, nor contagious, nor in any manner communicable from the sockets of one tooth to those of an adjoining one, except in a purely extrinsic way, and in this we believe him to be justified by the evidence at hand. He does not believe that the disease produces fetor of the breath, upon which point he says, "Of course an unpleasant breath may be concomitant, . . . but there is nothing in these diseases to produce one." This statement will be a surprising one to those who have carefully studied the disorder in question, but perhaps what constitutes an unpleasant breath may be a matter of personal opinion.

We are heartily in accord with the stress which the author places upon the importance of the diagnostic value which these disorders of the retentive apparatus of the teeth have in relation to constitutional or systemic disorders, especially as early indications of systemic vice. Incidentally the author states positively that enamel sometimes becomes "sensitized." In the light of embryological and histological knowledge of the enamel structure we would like to know how the sensitiveness of enamel can be possibly accounted for.

He regards hypercementosis as a cause of alveolitis, and devotes a considerable section of the work to an explanation of the rationale of its causal relation. As we view the pathology of the two disorders,—*i.e.*, hypercementosis and the form of alveolitis the author believes to be produced by it,—both have a common cause: namely, a progressively increasing irritation finally leading to inflammation and molecular death (necrosis) of the pericemental membrane; the irritation in its earlier and milder form resulting in a hyperplasia of the cementum, and in its more intense and later form cellular death of the investing membrane of the root. Hypercementosis is not a cause but a result of the disease; the cause is found in faulty metabolism or malnutrition. Tartar is but an incidental or adventitious source of additional irritation to the gum-margin, not an exciting cause as the author claims.

The author deserves much credit for his studies of the irritative action of bismuth salts upon the peridental membrane. He places the salts of that metal with those of lead and mercury as sources of irritation to the membrane. We regret that he is willing to jump at the conclusion that tartar is a "product of osseous metabolism," whatever that may mean, in the face of the very clear exposition of the method of its formation based upon experimental study made by Dr. Burchard in the January, 1898, issue of this journal, and to some his wire-drawn explanation of the existence of concretions at or near the apical terminations of roots will seem almost ludicrous. His theory for the existence of concretions in the region referred to is that they are impactions of small particles of tartar, salivary in origin, which have become detached from the coronal portion of the tooth, are driven under the gingival margin during mastication, and have gradually worked their way toward the apex and attached themselves more or less firmly to the root-surface. If such were the case, the concretions would be angular in form or at least show fracture-surfaces, whereas as a matter of fact they are characteristic in appearance, and in the form of nodular concretions of various sizes, singly or in groups.

Why the author should so laboriously and minutely elaborate his impaction theory, and then publish the statement of a noted extractor of teeth to the effect that in all of his practice he had never seen nor heard of a piece of calculus being found on or near the apex of a root with no opening to it, or had never seen nor heard reliably of tartar or anything resembling it being found as described in the face of reliable testimony to the contrary, we cannot imagine, unless it be that he is so wedded to his theory that phosphatic concretions, or at least the phosphatic concretions commonly known as tartar, cannot possibly be produced in the human system otherwise than as a salivary product.

The author splits hairs on the designation of these deposits of serumal calculus as tophi, his basis of contention being their lack of physical and clinical analogy to the tophi of gout.

Well, perhaps the designation is not a happy one viewed from that standpoint, but in the light of their ultimate pathology we think a closer study of the subject would reveal analogies of which the author is yet apparently unaware. He regards pericemental abscesses as caused by "a very minute hyperplasma in the pericementum itself," and then adds, "But there are never any calcic salts with the plasma," which is not in accordance with the statements of authorities, Foster for example. On the next page he says, "When fibroid proliferation is the result of inflammation, calcic salts may be found with it;" and we ask, "Where did the calcic salts come from in that instance?" and we would further ask, "How can a hyperplasma produce pus if the former is ever the cause of a pericemental abscess?" Or again, what warrant of fact or authority is there for the statement that Leptothrix buccalis is a chromogenic bacterium? The clear appreciation of the more recent advances in cellular pathology evinced by the author in the closing portions of his work is conflicting and incongruous, as related to many of his views respecting pathology of alveolitis as he describes it in the earlier portion of his volume.

There is so much in the work that is of great value, that it is almost irritating to constantly run up against this lack of harmony in the treatment of the subject as a whole. It is this feature which we think mars the value of the work more than anything else. It would seem that the full meaning and value of the later researches which the author so appreciatively quotes as bearing upon the etiology and pathology of the disease under consideration were added as an afterthought when the theories relating to the earlier treatment of the subject had been already written out.

The book is a most readable one, though if it were less diffuse in treatment we think it would be improved. At all events, it is a notable and valuable contribution to the literature of the subject, and a work which no student of dental pathology should fail to read.

We shall await with much interest the publication of the second volume, in which the author promises to deal with the therapeutics of the disorder and to give the methods of treatment which in his hands he has found to be so generally successful.

OBITUARY.

DR. WILLIAM GIBSON ARLINGTON BONWILL.

Dr. Bonwill died September 24, 1899, as stated in our previous issue, at St. Joseph's Hospital, Philadelphia. His death was due to uremia from nephritis and cystitis, brought on by an acute prostatic trouble. He had been ill for about seven weeks.

Dr. Bonwill was born in Camden, Delaware, October 4, 1833, and was the first son of Dr. W. M. Bonwill, a physician of the same place. His early education was obtained in the common schools. From his fourteenth year he utilized every opportunity to follow out his natural mechanical bent by doing work at carpentry, cabinet-making, etc., or, as he has himself expressed it, "doing anything that offered in mechanics from making a gunstock to a blacksmith's bellows or mending tin pans." He was clerk in a country store, and later a school-teacher in Burlington, N. J. After five months of the latter occupation he had saved one hundred and twenty-five dollars, and in April, 1853, he went under the private instruction of Samuel W. Neall, a dentist of Camden, N. J., with whom he remained six months. He then studied with Drs. Chapin A. Harris and A. A. Blandy, of Baltimore, who taught him the operative branch.

In October, 1854, he began the practice of dentistry in Dover, Del., and successfully continued it there until February, 1871, when he removed to Philadelphia and opened his office at 1104 Arch street in that city.

In 1866 he received the degree of Doctor of Dental Surgery from the Pennsylvania College of Dental Surgery, and later Jefferson Medical College conferred upon him the degree of Doctor of Medicine. He was married on June 13, 1861, to Miss Abigail E. Warren, an accomplished lady of Dover, Del., who died April 15, 1889. Three children survive him,—Dr. E. W. Bonwill, of Rangoon, Burmah; Mrs. Caleb J. Milne, Jr., of Philadelphia, and Mrs. Edward S. Gellatly, of New York.

Beside his numerous dental society connections, Dr. Bonwill was a member of the Union League, the American Philosophical Society, the Art Club, the Historical Society, the Academy of Natural Sciences, and the Delaware Club.

The portrait which we publish was not his latest, but the one which he himself regarded as his best likeness.

The death of Dr. Bonwill removes one of the most conspicuous and remarkable characters ever associated with the profession of dentistry. He was not an ordinary man, and cannot be judged by the standards of ordinary men. Versatile by natural endowment, his many-sided character presented itself to his colleagues and the world in such diverse manner as to lead to the most varied estimates of him. As a matter of fact but few people really knew Dr. Bonwill as he was, so aggressively did the many facets of his unique personality present themselves as occasion called them forth. Nervously active in temperament, he was not content to labor physically or mentally as other men, or in accordance with usual standards; the whole energy of his nature was concentrated upon whatever for the time being engaged his attention. He was aggressive in all things, and fearless of consequences in the prosecution of his endeavors. Criticism was to him a stimulant to renewed activity, failure a thing which did not enter into his calculations as a possibility.

To many he was incomprehensible and eccentric, but these knew him not. The impulsiveness of his nature manifested itself in his social relationships as in everything: kindly and affectionate to those whom he regarded as his trusted friends, and an implacable antagonist of those who were not of that class. He had the temperament of an artist as well as the qualities of a mechanician, a strongly developed love of the beautiful, an active imagination, a high order of creative talent in his chosen fields. These qualities gave direction and form to the intense activities of his nature, and made him so fertile in the long list of productions connected with his name, and which have made him famous throughout the world of dentistry.

As an operator his technique was remarkable. With the automatic gold-packing instruments of his invention he exhibited a speed and skill in operating which has, we believe, not been equaled. Gold foil under his manipulation became a plastic thing, and flowed into a cavity with a rapidity and exactness astonishing to the onlooker. His methods of practice from time to time underwent radical change.

About 1876 he announced the invention of his diamond reamer, a rapidly revolving diamond point, the use of which he advocated for permanently destroying contact of approximal surfaces not only for removing superficial caries, but in anticipation of the disease, his object being the same as that of Dr. Robert Arthur,—to secure permanent separations between the teeth.

His technique and the form of space which he advocated were, however, radically different from those of Arthur, especially in that the Bonwill method did not disfigure the buccal or labial contours of the teeth operated upon.

Later on the development of his electro-magnetic mallet, and more especially the invention of his automatic engine-mallet, drew his attention strongly to the value of full contour restorations over the method of separation by the diamond reamer as a system of practice, and he practically reversed his views with respect to permanent separations and became the enthusiastic advocate of full contouring operations. His operations in gold were numerous, elaborate, and wonderful, as has been already alluded to, but, notwithstanding his abilities and successes as a gold operator, he began the study of amalgam as a tooth-saving material. He made studies of its metallurgical and physical characters, and finally produced an alloy which suited his needs. With this he studied in a practical way the question of amalgam as a tooth-filling material. As a result he became as expert in its successful manipulation as he was already with gold.

Dr. Bonwill's reputation as a gold operator is world-wide; perhaps his ability to successfully manipulate amalgam is somewhat less widely known and appreciated. The writer hereof has never seen more beautiful and exact restorations with amalgam done by any one than those executed by Dr. Bonwill. Certainly he was a living refutation of the idea that as a man falls off in manipulative skill the more he leans upon plastics, for his skill was equally great as an operator in both gold and amalgam.

As a teacher he was interesting and instructive; his method was his own. Every one who sought his instruction was welcome; he gave freely of his teaching to all who desired it. He had faith in his ideas, and it was his desire and ambition to perpetuate them for the general good. As he taught, so did he write. Much that he wrote was presented in such form as to place it beyond the grasp of those who were unwilling to delve beneath the externals of his thought for the kernel of truth his words always contained, but those who studied him rarely failed to secure new and valuable items of truth.

Some of his more notable papers are as follows:

1874. "The Electro-Magnetic Mallet." (Read before the Susquehanna Dental Association, May 14.) *Pennsylvania Jour. of Dental Science,* i, 257.

1875. "The Air an Anesthetic." (Read before the Franklin Institute of Philadelphia, November 17.) *Ibid.,* iii, 57.

1881. "The Salvation of the Human Teeth." (Read May 7.) *Trans. Odontological Society of Pennsylvania,* 1881, p. 107.

1882. "Plastic Gold Alloys." [Bibulous paper recommended for absorbing surplus mercury from amalgam.] (Read January 7.) *Ibid.,* 1882, p. 143.

1885. "Geometrical and Mechanical Laws of Articulation." (Read June 6.) *Ibid.,* 1885, p. 119.

"Philosophy of the Tooth-brush." (Read November 7.) *Ibid.,* App., p. 1.

1887. "Regulators and Methods of Correcting Irregularities." (Read June 4.) *Ibid.,* 1887, p. 281.

1890. "New Method of Clasped Plates *versus* Bridge-work." (Read June 7.) *International Dental Journal,* xiv, 86.

1893. "What has Dentistry to Demonstrate Against the Hypothesis of Organic Evolution?" *Trans. World's Columbian Dental Congress,* i, 226.

1897. "Cataphoresis *versus* The Direct Application of the Galvanic Current for Obtunding Sensitive Dentin; and How to Conduct a Practice that Excludes Both." (Read before the Dental Section, American Medical Association, June 2.) *Dental Register,* li, 381.

1898. "Reminiscences of a European Trip to the International Medical Congress at Moscow in 1897." *International Dent. Jour.,* xix, 646, 707, 749.

1899. "The Scientific Articulation of the Human Teeth as Founded on Geometrical, Mathematical, and Mechanical Laws." *Items of Interest,* xxi, 617.

Of the products of his inventive genius the following are the most important:

The electro-magnetic mallet, which, according to the statement of its inventor, had its inception in 1867, and which was patented by him in 1873. For this device the Franklin Institute of Philadelphia, in November, 1875, awarded him its "Cresson" gold medal of the first magnitude. His first dental engine, invented in 1873, was patented in 1874, but was not used. His cord dental engine, the one popularly known as the Bonwill dental engine, and which embodied the essential principles of the Bonwill surgical engine, was patented in 1877, and put upon the market in 1879.

In 1875 he announced his discovery of anesthesia by rapid respiration, in a paper read before the Franklin Institute in November of that year. In 1879 he patented his automatic engine-mallet, the basal principle of which was, however, embodied in the revolving hammer plugger of Donaldson, patented in 1875, but neither had knowledge of the other's invention until the Bonwill mallet was made the subject of patent application. In 1880 he made application for a patent upon the Bonwill tooth-crown, which was allowed in 1881.

He was the inventor of the diamond reamer, already alluded to; the use of Japanese bibulous paper in the introduction of amalgam fillings; a double disk device for reducing and pointing nerve-canal broaches, hard rubber and corundum disks; a cervical matrix; numerous attachments for the dental and surgical engine; a system of clasped partial dentures as a substitute for bridge-work, and numerous methods of procedure in practical dentistry.

His anatomical articulator must be classed with his major inventions not only because of the intrinsic merit of the appliance, but because in connection with it he developed his system of articulating artificial teeth upon certain geometrical laws which as yet have not received the recognition and general understanding by the profession which their importance demands. Dr. Bonwill believed that his postulate of the geometrical construction of the human mandible contained the basal truth which when carried to its full logical consequence demonstrated the negation of the doctrine of evolution of animal forms. His hypothesis is as yet unproven, and at the time of his death he was at work upon a volume to be published in its defence, but apart from that phase of the question his studies of human articulation have furnished us the first solid basis for the prosthetic reconstruction of the human denture yet enunciated. His activities as an inventor were not limited to dental fields. He invented improvements in grain reapers, kerosene lamps, shoe fasteners, was at work on an aerial car run upon the trolley principle, and claimed to have invented the Giffard injector four years before it was brought out in France by the inventor whose name it bears.

It is quite impossible to more than briefly allude to the more important of his works. In his especial sphere he stood alone. The profession he loved has profited by his genius perhaps more than they can understand. He sometimes expressed the belief that he was not appreciated at his full worth. Who can tell? He was honored at home and abroad by his *confrères,* an honorary member of Russian, Dutch, German, Spanish, and French dental societies, from each of which he received decorations and honors. In America he was equally honored, and certainly as well loved, even though the differences which his peculiar personality at times engendered provoked temporary antagonisms. He was Bonwill from first to last, and to those who knew him best he was greatest.

DR. GEORGE H. WEAGANT.

George H. Weagant, L.D.S., died at his residence, Second street, Cornwall, Ont., on July 8, 1899, in the forty-seventh year of his age.

He was born in Morrisburg, Ont. His dental pupilage was with Dr. J. B. Willmott, in Toronto, and he subsequently was graduated at the Royal College of Dental Surgeons. For the past twenty-five years he has practiced dentistry in Cornwall.

He occupied a very prominent place in the profession, being recognized as one of the most proficient and successful dentists in Canada. He was examiner in physiology in the Royal College of Dental Surgeons for two years, and a past-president of the Eastern Ontario Dental Association, which he was chiefly instrumental in forming, and of which he held the position of secretary-treasurer for fifteen years, being re-elected at the convention held in Kingston in June last. Dr. Weagant was the first to bring to perfection copper amalgam, with which his name has become identified, and he also suggested the diamond trephines for inlay work.

The funeral took place on Monday afternoon, July 10, being conducted by the Free Masons. The I. O. O. F. and A. O. U. W. also attended in a body, the procession being very large. The floral offerings were profuse and very beautiful, including a wreath from the Cornwall dentists, a pillow from the Eastern Ontario Dental Association, and an anchor from the Ottawa dentists.

A widow and six children survive, and have the sympathy of the whole community in their bereavement. A. A. S.

DR. E. M. NELSON.

Died, September 15, 1899, at the Massachusetts General Hospital, from apoplexy, Dr. Everett M. Nelson, of Boston, Mass.

Born in Castleton, Vt., July 23, 1850, Dr. Nelson had been connected with dentistry from 1873, in which year he became a pupil of Dr. Thos. Mound, of Rutland, Vt. Two years later he left his native state, and began the independent practice of his profession in Lowell, Mass. He later removed to Boston, where he had been for many years in practice, when the unexpected stroke of death terminated his labors and brought bereavement with grievous suddenness to his home, and deep regret to the wide circle of his friends.

Dr. Nelson leaves a widow, formerly Miss Clara S. Tourjee, to whom he was married September 2, 1885, at Boston, and two daughters, three and five years of age respectively.

DR. CLARENCE M. DODGE.

Dr. Clarence M. Dodge, of Fall River, Mass., met his death through a deplorable accident, June 22, 1899. While taking a sail on the river near his home he was stunned and carried overboard by the boom of his sailboat, and was drowned.

The deceased was born in Jamaica Plains, near Boston, Mass., January 28, 1848. His entry upon the practice of dentistry occurred nearly thirty years ago, at Peterboro, N. H. He removed a few years later to Fall River, where the remainder of his life was spent.

Energetic and resourceful in character, Dr. Dodge was successful in his chosen profession, being known as eminently a progressive dentist, and owning one of the best-equipped offices in New England, while his personal worth as a man of strict integrity and high moral character endeared him to a large circle of devoted friends, to whom his sudden removal comes with the weight of a personal affliction.

He leaves a widow, *née* Emma M. Handy, to whom he was married November 28, 1872, at Keene, N. H.

DR. CHARLES M. CANNON.

Dr. Charles M. Cannon died January 11, 1899, in Salt Lake City, Utah, at which place also he was born, January 2, 1869. He was graduated at the New York College of Dentistry March 10, 1891.

The Utah Dental Association, of which Dr. Cannon was an honored member, in passing resolutions of regret and condolence, thus testify to the high professional and private character of their deceased *confrère:* "It has been our privilege to observe his great worth in professional life as one of high attainments; in civic life as a progressive, intelligent, broad-minded citizen; in private life as a dutiful son, an affectionate husband, a loving father, and a faithful friend."

DR. ROBERT I. VERPLANCK.

Dr. Robert I. Verplanck died at his home, Albany, N. Y., August 27, 1899, from pneumonia. His death occurred on the fortieth anniversary of his birthday, he having first seen the light August 27, 1859, at Indian Fields, N. Y.

After a period of pupilage spent with Dr. Henry S. Whitbeck, he entered on dental practice at Greenville, N. Y., in 1876. For many years before his death he had resided at Albany, where, in 1894, he married Miss Ida B. Oakley, who died in 1896, without issue.

His active interest in all that pertained to the elevation of his profession, together with his high character as a man, made Dr. Verplanck a highly valued member of the various dental societies in which his name was enrolled,—viz, the New York State Dental Society, the National Dental Association, and the Third District Dental Society. Resolutions passed by the last-named body, of which he was president during 1897 and 1898, warmly testify to the love and esteem in which Dr. Verplanck was deservedly held in the professional, civic, and private circles in which he moved.

DR. W. R. MCCLOSKY.

DIED, at Curwensville, Pa., July 9, 1899, at the home of his parents, Dr. W. R. MCCLOSKY.

He was born in Clinton county, Pa., in December, 1858. His parents removed to Curwensville when he was four years old, and here he received his education, and later engaged in teaching for a few years.

In 1883 he entered the dental office of Dr. J. M. Stewart, of Clearfield, where he studied for one year; later he took a course in the Pennsylvania College of Dental Surgery, and was graduated therefrom in 1887. He opened a dental office in Orbisonia, but, not finding sufficient inducement to continue there, he accepted for a time a position as principal of the public schools of Slatington, Pa. After a while, however, he resumed the practice of dentistry in Weatherly, Pa., where he remained for several years. In October, 1898, an exacerbation of nervous troubles from which he had long suffered compelled him to relinquish professional work. He entered the Sanatorium at Clifton Springs, but found only temporary relief.

In 1895 he married Miss Lloyd, of Weatherly, Pa., who, with two children, survives him.

Dr. McClosky was a man of sterling integrity, finely cultivated mind, and genial disposition. By his removal thus early in life the profession loses a most worthy member and the community an upright man.

DR. HIRAM HILL.

DIED, at his residence, Manchester, N. H., on July 12, 1899, HIRAM HILL, D.D.S., from pneumonia.

The deceased practitioner was born July 15, 1830, at South Hookset, N. H. His connection with dentistry began as long ago as 1856, when he became a pupil of Dr. Robinson, afterward entering upon independent practice at Manchester, N. H. On March 4, 1874, he was graduated at Boston Dental College. He was a distinguished member of his profession, and his devotion to its interests and his high character were gladly recognized by his brethren. The New Hampshire State Dental Society made him their presiding officer, and he was likewise elected to the presidency of the New England Dental Society.

Dr. Hill was twice married. His first wife was Olive B. Fowler. After her death he married Caroline Lord, now also deceased. He left no issue.

DR. SILAS B. JOHNSTON.

DIED, at Auburn, Ind., July 8, 1899, Dr. SILAS B. JOHNSTON.

Dr. Johnston, who was born in Wayne county, Ohio, and served the Union cause as a member of the 102d Ohio Volunteers during the civil war, chose Indiana as the field of his professional labors, his entrance upon dental practice having occurred in 1867, in which year he opened an office in Waterloo, Ind. He was a member of the Northern Indiana Dental Society.

He married, March 24, 1858, Catherine E. Shull, who died in 1892. On October 31, 1894, he married Mary E. Rummell, who survives him. He leaves also two children by his first wife,—viz, M. W. Johnston, D.D.S., of Garrett, Ind., and Mrs. C. A. Pearson, of Chicago.

DR. W. N. AMER.

DR. WILLIAM N. AMER, for many years one of Lancaster's leading dentists, died at two o'clock Wednesday, September 20, 1899, at his home in Lancaster, Pa. He had an attack of the grip several years ago, and since then had never been in good health. Three weeks previously he was attacked with brain fever, and for some time past he had been in a semi-conscious state, due to congestion of the brain, remaining in that condition until the end arrived.

The deceased was born in Philadelphia, August 19, 1834, and he was, therefore, in his sixty-sixth year. He was the son of John Amer, a hat manufacturer, who still survives in New Brunswick, N. J., in his ninety-second year. In 1844 Dr. Amer removed to Boston, where for some years he remained with his uncle, Dr. Nichols, a dentist, meanwhile completing his education at the High School at Roxbury, Mass. His father having removed to Lancaster, the young man went there, too, and studied dentistry with Dr. Wayland, remaining five years with his preceptor, first as a pupil and later as an assistant. In April, 1856, Dr. Amer opened his own office in Lancaster, in which city he practiced until his death. He was married in 1856 to Miss Elizabeth S. Cooper, by whom two children survive.

Dr. Amer was one of the organizers of the Harris Dental Association, of Lancaster, in 1867, of which he was at one time president, and its secretary for many years. He was also a prominent factor in the organization of the Pennsylvania State Dental Association, which was organized in Philadelphia, though he was not connected with it at the time of his death. He was one of the organizers of the old Empire Hook and Ladder Company of Lancaster, and was its vice-president fourteen years. He was a Mason of prominence, and was a Past Master of Lamberton Lodge, No. 476, of which lodge he was secretary for over fifteen years.

In religion Dr. Amer was a Moravian, and in politics a Republican.

HINTS, QUERIES, AND COMMENTS.

SOLID CAST GOLD CUSPS FOR CROWNS.—Some time since I was present at a jeweler's when a gentleman came in with a pair of link cuff-buttons, and asked the proprietor if he could duplicate them. The jeweler replied that he would try to procure from the manufacturers the duplicate design, but that he doubted that he could purchase it, as the dies were probably laid aside for more recent designs.

The gentleman expressed his desire to have it duplicated, and the jeweler replied that if he could not secure it at the manufacturer's he would make one himself. "But if I make one it will contain much more gold and be much heavier than these." "All right," replied his customer. "I am particular to replace the one I lost, as it is a keepsake."

The next evening I saw the finished ornament,—a beautiful piece of work. Handing me the eyeglass, he requested me to detect the difference between the die-struck one and his duplicate of it. To the naked eye it was perfect, and the glass showed a remarkably sharp casting that was but little different from the work of the hydraulic die-press.

He then showed me the process, that struck me is of value to dentists who may need a solid cusp crown, or even to make a casting for several teeth in case of a bridge. He takes a piece of cuttlefish bone, such as sold for use in bird cages, and dresses the soft side flat with a coarse file,—a rubber file will do it nicely,—and presses the piece he wishes to duplicate into it to the required depth. Another piece of cuttlefish bone, filed flat, is placed over it, and a hole is gouged out in the first piece with a channel to the mold thus formed. The two pieces are then wired together, and scrap gold placed in the second hole is melted with the blow-pipe; and when at a proper heat the mold is filled and the cast is made.

With the excellent steel dies that we now have it is the work of but a few minutes to make a cast cusp by this method, and even a natural tooth would make a mold that would be desirable, as it would duplicate exactly every cusp and fissure.

From this suggestion it is but a step, and only a matter of detail, to cast the cusps for several teeth for a bridge, using a dummy of type metal to make the mold in the cuttlefish bone.—W. H. MITCHELL, D.D.S., Bayonne, N. J.

A MONTHLY BIBLIOGRAPHY OF DENTAL LITERATURE.

COMPILED BY J. MELVIN LAMB, M.D., D.D.S., WASHINGTON, D. C.

The abbreviations of titles used are those common to bibliographical work, and will, it is presumed, be readily comprehended by any one familiar with dental or scientific publications. Any explanation will be gladly furnished by the compiler. A star (*) indicates a thesis.

Medical and dental red book; a register of all the physicians, surgeons, dentists, druggists, nurses, etc., of Cleveland and vicinity, together with a digest of the state laws, and the city laws pertaining to the professions and other miscellaneous matter. Compiled by Louis J. Livingston. Cleveland, 1899, Helman-Taylor Co., 372 pp. 12°.

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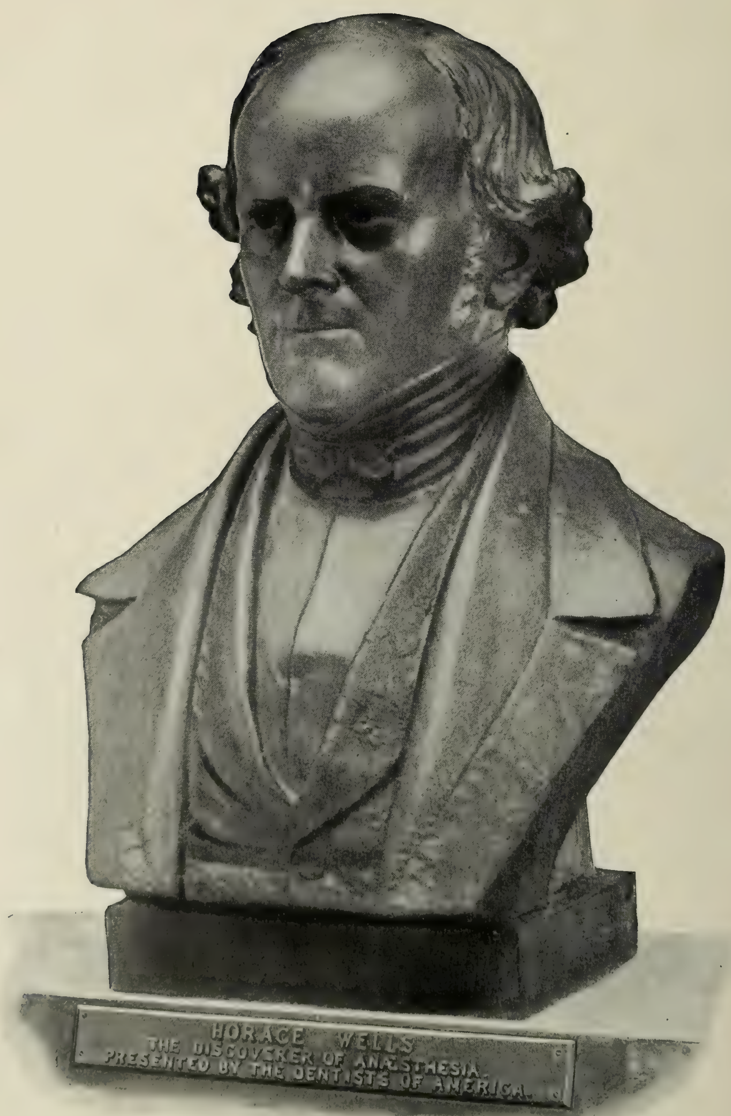
LIST OF UNITED STATES PATENTS

PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING SEPTEMBER, 1899.

Sept. *5.*—No. 632,524, to Ada V. Goltermann. Tooth-brush.
" *12.*—No. 632,843, to Nicholas B. McGhee. Dental forceps.
" " No. 632,945, to Miland A. Knapp. Adjustable tooth-band.
" " No. 633,071, to John S. Campbell. Artificial tooth.
" *19.*—No. 633,125, to George P. Davis. Dental cuspidor.
" " No. 633,128, to Friedrich Ernst. Artificial tooth.
" " No. 633,222, to Willard Streetman. Casting aluminum dental plates.
" *26.*—No. 633,859, to Theodore G. Lewis. Blowpipe.


HORACE WELLS
THE DISCOVERER OF ANÆSTHESIA.
PRESENTED BY THE DENTISTS OF AMERICA.

THE

DENTAL COSMOS.

VOL. XLI. PHILADELPHIA, DECEMBER, 1899. No. 12.

ORIGINAL COMMUNICATIONS.

RESULTS THAT FOLLOW THE EXTRACTION OF PERMANENT TEETH.

BY E. A. BOGUE, M.D., D.D.S., NEW YORK, N. Y.

(Read before the National Dental Association, August 1, 1899.)

NOTWITHSTANDING the elaborate devices for crowning roots and building bridges over vacancies in the human mouth, it still seems evident that a large proportion of practicing dentists are engaged in verifying the old dictionary definition of a dentist, "A man who pulls out teeth and puts in others." Certain others seem to find it necessary to extract teeth for purposes of regulation, and still others continue to extract for what they are pleased to term prophylactic reasons. These latter generally choose the first permanent molars as their victims, on the ground that at twelve or fourteen years of age these teeth are found to be excessively decayed, having received no more attention than the deciduous teeth, for which they are generally mistaken by the parents.

A few, dismayed by the havoc wrought by extracting the first molars, have tried to compromise by extracting some of the smaller bicuspid teeth, seeking to minimize the evil wrought, but still clinging to extraction as the remedy *par excellence* for the dental surgeon to apply in a multitude of cases when he does not know what else to do.

As comparatively few of our craft have taken pains to preserve models, taken from the same patient year after year, knowledge of the results that follow extraction is generally rather vague. I shall take the liberty, therefore, of bringing to your attention some of the results of my own errors, as well as those of others, over which I have kept watch for many years, taking impressions of the same persons almost every year for from ten to twenty years past.

While this paper was in preparation, a professional friend remarked that some of these results might be good and some bad.

I stop here to say that it must necessarily depend upon the conscience, enlightenment, and powers of foresight of each individual operator to decide in each given instance what is for the best in that case; and while I may call attention to underlying principles, it will not be my province to attempt to apply those principles for any one else.

I have, for example, seen cases where the last molar teeth were the only ones in the mouth that touched, and the patient had reached adult life. Would not extraction be advisable? I do not know.

I have seen many cases of irregularity complicated with cleft palate. I have seen cases where the cusps seem to strike end to end. Some of these cases may seem to be exceptions to the principles thus far discovered. Whether they are or not we shall only know after the results of treatment appear. A well-known separationist, who believes that the mouth is a garden, and extracts and files accordingly, once criticised a model that I was exhibiting, saying that the man who had had charge of that mouth during early childhood and youth ought to be prosecuted for malpractice, for the extractions and fillings which had been done were abominable and worthy the severest reprehension. I pretended to defend as well as I could the action of the supposedly unknown operator, saying that he had evidently followed the teachings of his critic, but he reiterated more strongly than before that the result seemed that of ignorance and incapacity, if not of something worse. My reply to him finally was that he himself had cared for the young lady from her birth until she was married. A well-known New York dentist had then cared for her three years, and she then came to me one year, at which time I had procured the impressions, and we three must be responsible for her present condition. The fact is that not only do very few of us retain models year after year, so that we may know accurately what the results of our operations have been, but sometimes we do not retain the patients, and then surely we do not know.

For the sake of clearness I will give in the first place a list, probably not complete, of the results that follow extraction, and then will explain those results one after the other, lest there should be some to whom occasionally they might not be familiar.

First, then, it diminishes the size of the dental arches.

Second, it straightens some of the lines in those arches so that the arch in certain directions is scarcely perceptible. This straightening becomes very evident at times when one has tried ineffectually to place a rubber-dam on one of these straightened arches where the teeth lean forward.

Third, it diminishes the size of the arch of the palate.

Fourth, it shortens the bite. That is, it causes the nose and chin to approximate more than would be normal had there been no extraction.

Fifth, it often causes separation of the upper incisor teeth.

Sixth, it causes exposure of the gums wherever the triturating or cutting ends of the teeth are not in contact.

Seventh, it prevents thorough mastication. First, because hard bits of food strike the gum where spaces exist, giving pain or inconvenience; second, because the occluding surfaces of the teeth do not mesh.

Eighth, it causes undue wearing down of the cusps of the teeth.

Ninth, it tends later on in life to fractures of the teeth at points of malocclusion.

Tenth, it gives greater liability to the deposit of tartar.

Eleventh, it withdraws the normal support of the teeth, each against the other, which originally constituted the arch, resulting in a weakening of the powers of mastication or crushing of hard food.

FIG. 1.

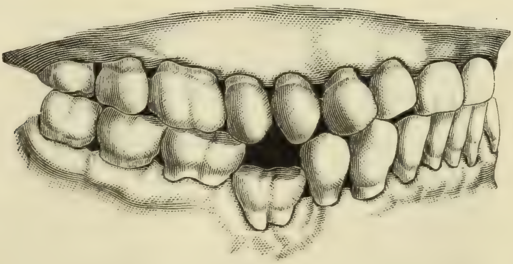
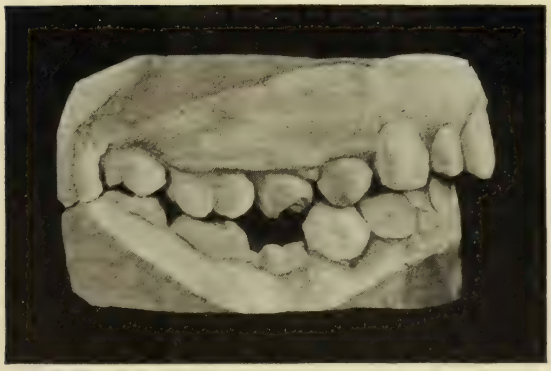


FIG. 2.



Figs. 1 and 2 show the height to which the permanent teeth grow above the level formerly occupied by the temporary teeth.

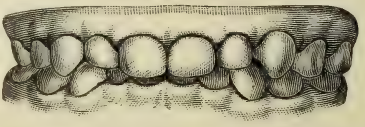
Twelfth, it causes as surely undue crowding between the teeth that remain and touch at their grinding edges as it gives space in the places left by extraction.

Thirteenth, it causes a rotation upon their own axes of the teeth, which lean forward after extraction so that their contact with the adjoining teeth, if contact comes, is awkward, and is conducive to undue deposits both of food and tartar.

Fourteenth, it diminishes the needed room for the tongue, so that speech frequently becomes less distinct than it would otherwise have been; and sometimes it leaves so little room that the patient complains of being cramped in tongue movement.

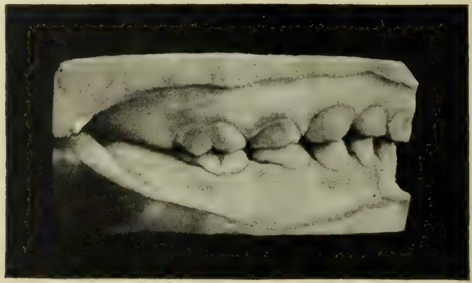
Fifteenth, finally, if the extraction has been early in life the development of the palatine arch is so much interfered with that it becomes impossible to develop first-class vocalization. Patti would never have been heard of had she lost her first permanent molars at the age of eleven or twelve.

FIG. 3A.



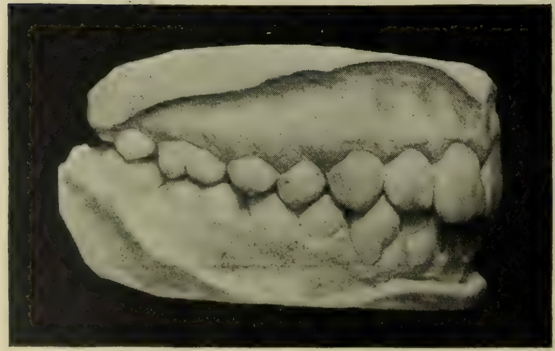
Shows teeth at three years of age (from August DENTAL COSMOS, 1889).

FIG. 3B.



Same mouth at five and one-half years.

FIG. 3C.



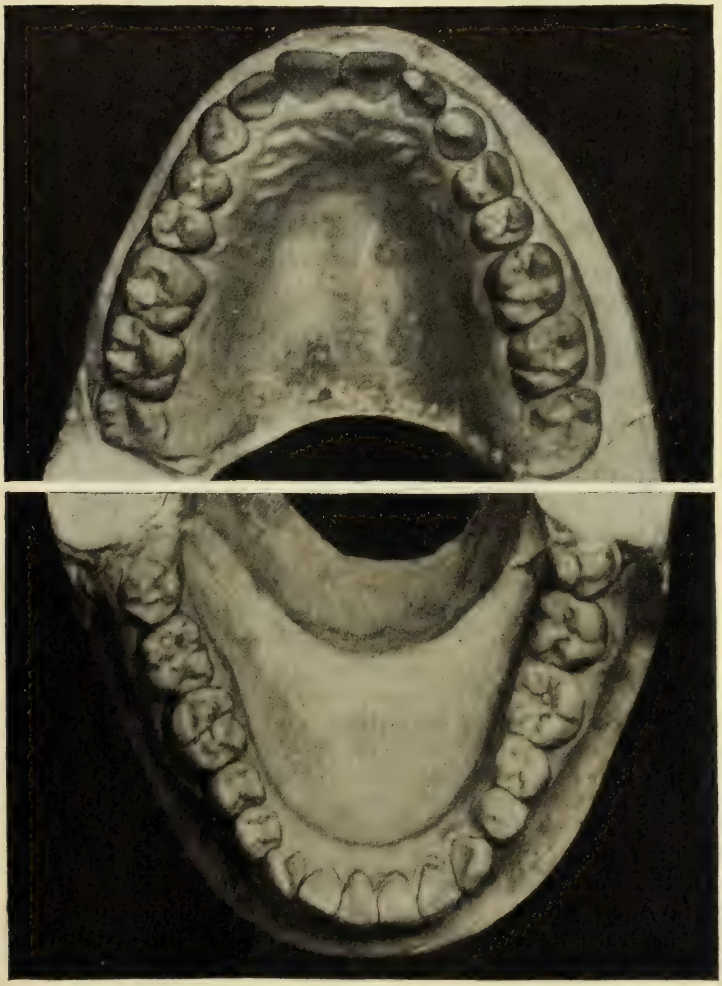
Same mouth at thirteen years. These three together show the direction in which growth has taken place.

Now, to review individually and very shortly these fifteen results, or rather fourteen, and the repetition of the third. First, as the child grows, and the dental arches enlarge, the alveoli expand mainly in two directions, from above down and from below upward. (See Figs. 1 and 2.)

Notice that the second temporary molars were caught between the developing first permanent molar and the first bicuspid, and retain the positions occupied in childhood.

Then from the front backward, the greatest increase being back of the deciduous teeth. This latter increase is well shown by placing the models of the temporary teeth of any child upon the models of the permanent teeth of the same child after it shall have grown up (Figs. 3A, 3B, 3C).

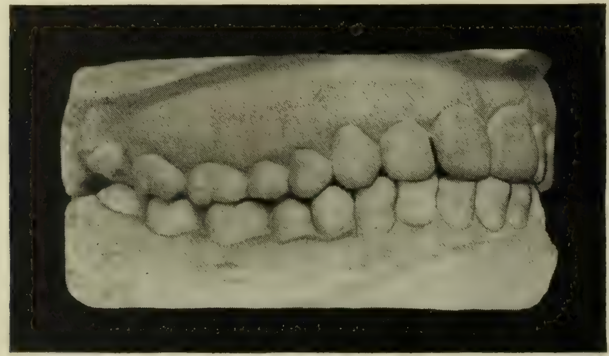
FIG. 4A.



Shows a very perfect set, open, the curves of which are easily seen.

By looking carefully at the positions of the temporary teeth we find an arch which is a pretty good horseshoe; that is to say, fairly round from one end of the arch to the other, and pretty nearly a straight line from the front backward from the incisors to the farther end of the molars. If all the dental organs, temporary and permanent, are faithfully preserved to fulfill the functions of maturity, the second permanent molars developing upon the curve of that lower jaw, which has grown backward and upward beyond what it was when it was that of a baby, will be a little higher than the first permanent molars. Following the line of that upward curve, the crown of the second molar leans forward and pushes against the first permanent molar at the point where the enamel is thickest; and this is at the greatest tuberosity of the tooth (see Fig. 4B). The third molar, when it appears, regularly rises still higher up the curve of the lower jaw than the second molar, and leans against the second in exactly the same relative position that the second molar leans against the first, so if the teeth in the lower jaw are normally developed and normally placed they form six different arches, the first being from the ascending ramus around to the ascending ramus again (Fig. 4A).

Fig. 4B.



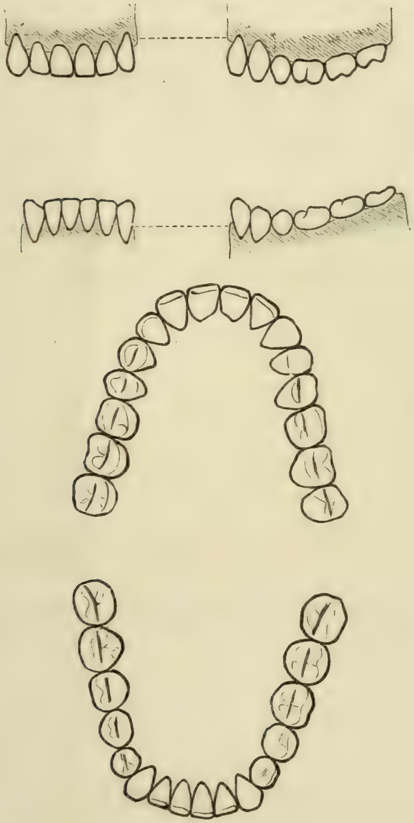
Same set closed; curve from before backward particularly clear.

The second arch being a convexity looking upward of the six anterior teeth (Fig. 5).

The third and fourth being a convexity looking downward, thus making a concavity from the cuspid on each side back to the third molar (Fig. 4B).

The fifth and sixth being a slight curve of the molars outward toward the buccal side (see diagram) above. (Fig. 5.) If the upper jaw be normal it will also have corresponding curves, and if the upper teeth develop normally their cusps will articulate in a certain fixed manner with the cusps of the lower teeth; and, as the lower jaw is broader than the upper, the lower molars and bicuspids incline slightly inward toward the tongue, while the upper molars and bicuspids lean outwardly toward the buccal side, and thus bring their occlusal ends into contact with those of the lower teeth, which are first developed. In this way the largest superficial areas of these corrugated or cuspid surfaces are brought into contact, so that they may most effectively grind the food. If these arches be in any way disturbed, either by enlargement or diminution, the meshing of the cusps of the upper and lower teeth is as distinctly disturbed as though an obstruction were put between two cog-wheels. If a tooth be extracted from one of these complicated dental arches of sixteen members each, it is like extracting cogs from one of those wheels. As nature abhors a vacuum, she seeks to fill up the space caused by extraction, and succeeds more or less well according to circumstances and the age at which the extraction took place. If the extraction take place at the age of fourteen or fifteen, or thereabouts, there is always a tipping forward of the teeth next back of the space produced by extraction. There is also invariably more or less rotation on its axis of this posterior tooth. By just so much as this tooth leans forward its triturating surface is separated from that of its opposite in the other jaw, and the area of mastication is thereby diminished from one-third to three-fourths; so that we have all seen the extraction of the four first molars result in the loss of not only those four, but of two-thirds of the triturating surfaces of the next four teeth back of these (Fig. 6).

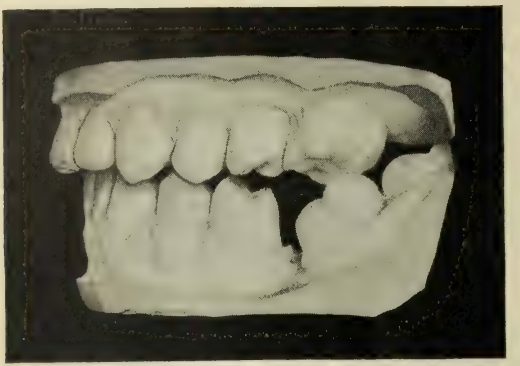
FIG. 5.



Curves of the arches.

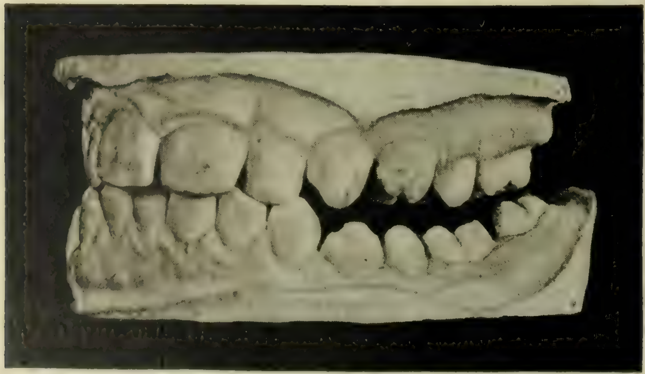
If the extraction took place at or before the twelfth year the second molar, pushed forward by the developing third molar (if there be one), will sometimes almost completely take the place of the extracted first molar. In that case, however, we sometimes are obliged to put in artificial teeth for these poor little victims to chew upon while the temporary teeth are being shed and the second permanent molars developing; meantime the general condition of the patient, owing to inability to masticate food and the constant irritation caused by striking the incisor teeth together, is apt to be very seriously disturbed (Fig. 7).

FIG. 6.



Shows great tipping and dreadful malocclusion.

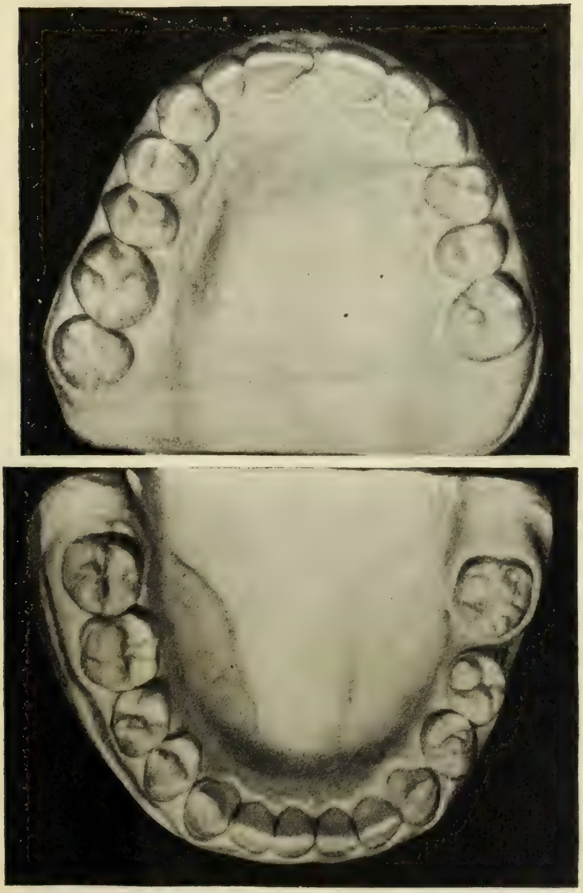
FIG. 7.



Shows a case where extraction left the child for a while with no masticating ground.

Granting that these years of development have been safely passed, and that the second permanent molars have as nearly as possible taken the place of the first permanent molars, and that the regularity of the teeth is so perfect that no one but a dentist, and an observing one at that, could possibly detect that a tooth had ever been lost, we then come to the second result mentioned above,—namely, the straightening of the lines of the dental arches. (See Figs. 8A, 8B, and 8C, Figs. 9A, 9B, and Figs. 10A and 10B.) The curves so visible in Figs. 4A and 4B are conspicuously absent in Figs. 8, 9, and 10.

Fig. 8A.

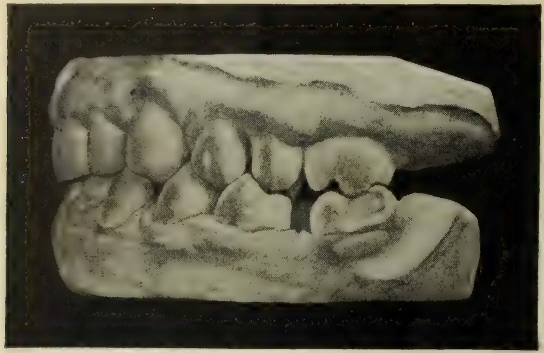


Shows diminution in size of dental arch from extraction; also non-appearance of wisdom teeth (third molars) on one side; also marks of wear on upper incisors, especially marked.

When we look at the jaw of the child, with its twenty teeth, we find that the lines of occlusion from the central incisors back to the last molars vary but little from straight lines. (See Figs. 3A and

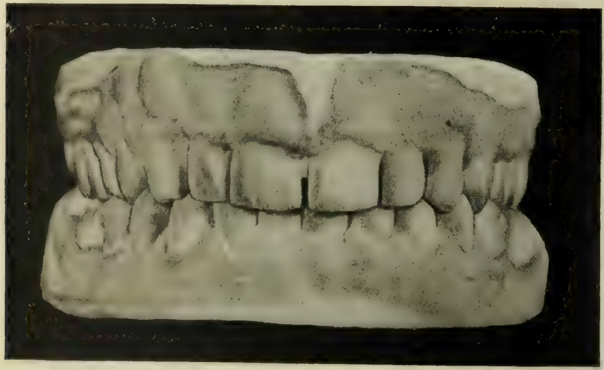
3B.) But these twenty teeth are for the use of that child during its infancy and up to about the tenth year of its age, and are adapted to the mastication of the soft food which constitutes the child's nourishment; but these teeth and these lines are no better adapted

FIG. 8B.



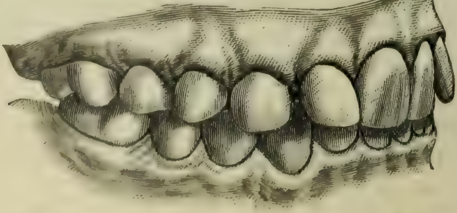
Shows faulty articulation, shortening of the bite, so that the lower incisors are largely hidden from view; and straightening of the lines so that the curves shown in Fig. 4 do not exist.

FIG. 8C.



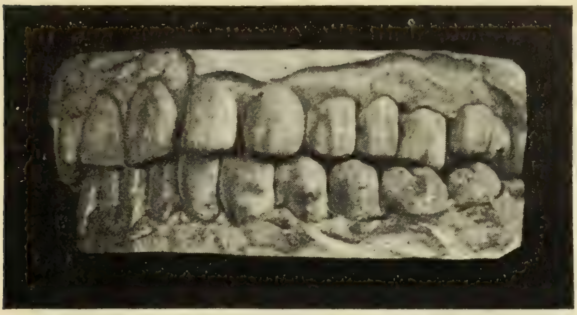
Front view; shows shortened bite, straightened lines, and the upper incisors being separated by the occlusion against them of the lower incisors.

FIG. 9A.



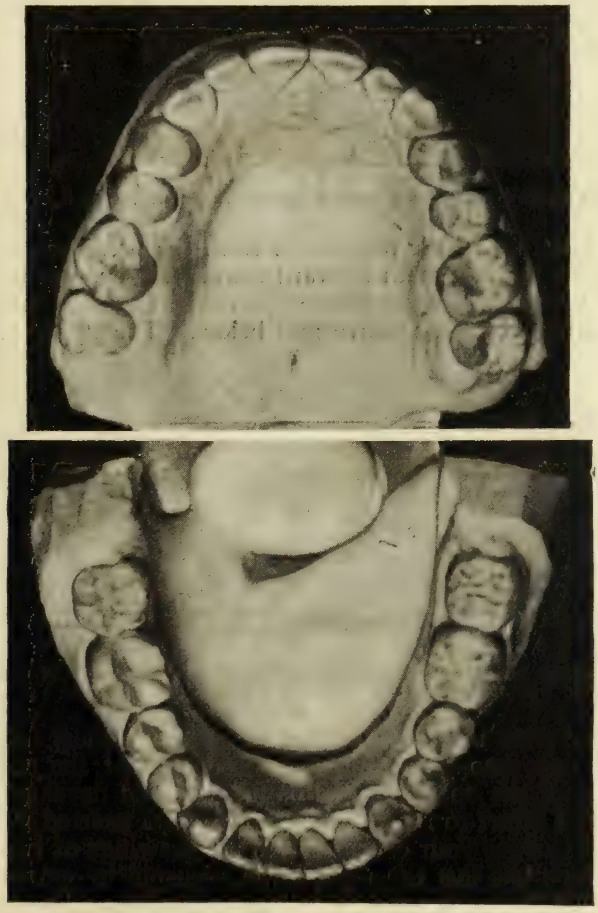
Shows a mouth from which the second molars were extracted in June, 1886, hoping to prevent approximal decay.

Fig. 9B.



Same mouth in 1899; decay constant, fractures occurring from the tremendous pressure of the bite, which is not supported by the curved lines of nature, but has only the straightened lines resulting from the mutilation of extraction.

Fig. 10A.

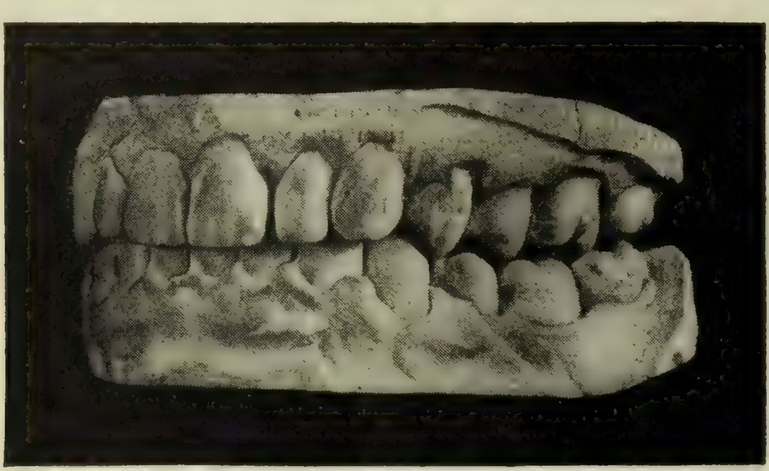


A most successful result after extraction of first permanent molars, showing, nevertheless, though not quite to the same degree, all the bad features of the two preceding cases.

to the necessities of adult life than the druggist's spatula and marble slab are to take the place of the mortar and pestle when he needs to do heavy work. So, until the osseous frame and the muscular development have reached a point where strong mastication of hard, rough, fibrous food is necessary, these feebler masticators are enough. The human animal does not reach its maturity before eighteen or nineteen years of age,—perhaps not then,—and teeth arranged to meet each other in nearly straight lines are not well calculated to do heavy work.

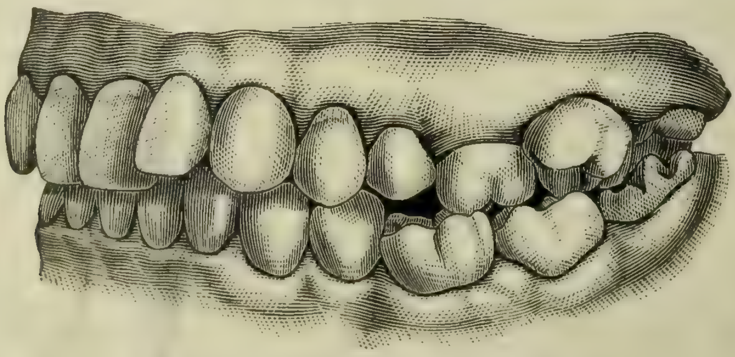
In the eruption of the permanent teeth the pressure of development is from the last tooth forward toward the cuspids both above and below, while the force of the lips draws backward toward the cuspids all incisor teeth above and below. The upper and lower cuspids therefore may be regarded as being the most nearly fixed points of any among the movable occupants of the mouth. In illustration of the operation of this fixed law of development, and that nature's effort to repair damage is always exerted along these lines, I present for your consideration the drawings of two mouths, one of which has lost the right lower bicuspid by extraction, the other the left lower bicuspid by failure to develop. The results are the same. (Figs. 11 and 12.)

FIG. 10B.



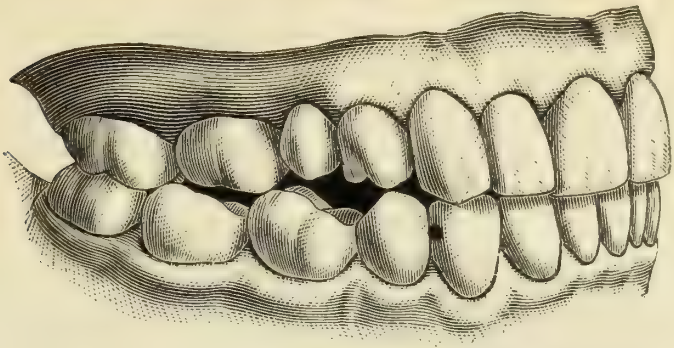
Same mouth closed, bite shortened, curves straightened, tartar depositing.

FIG. 11.



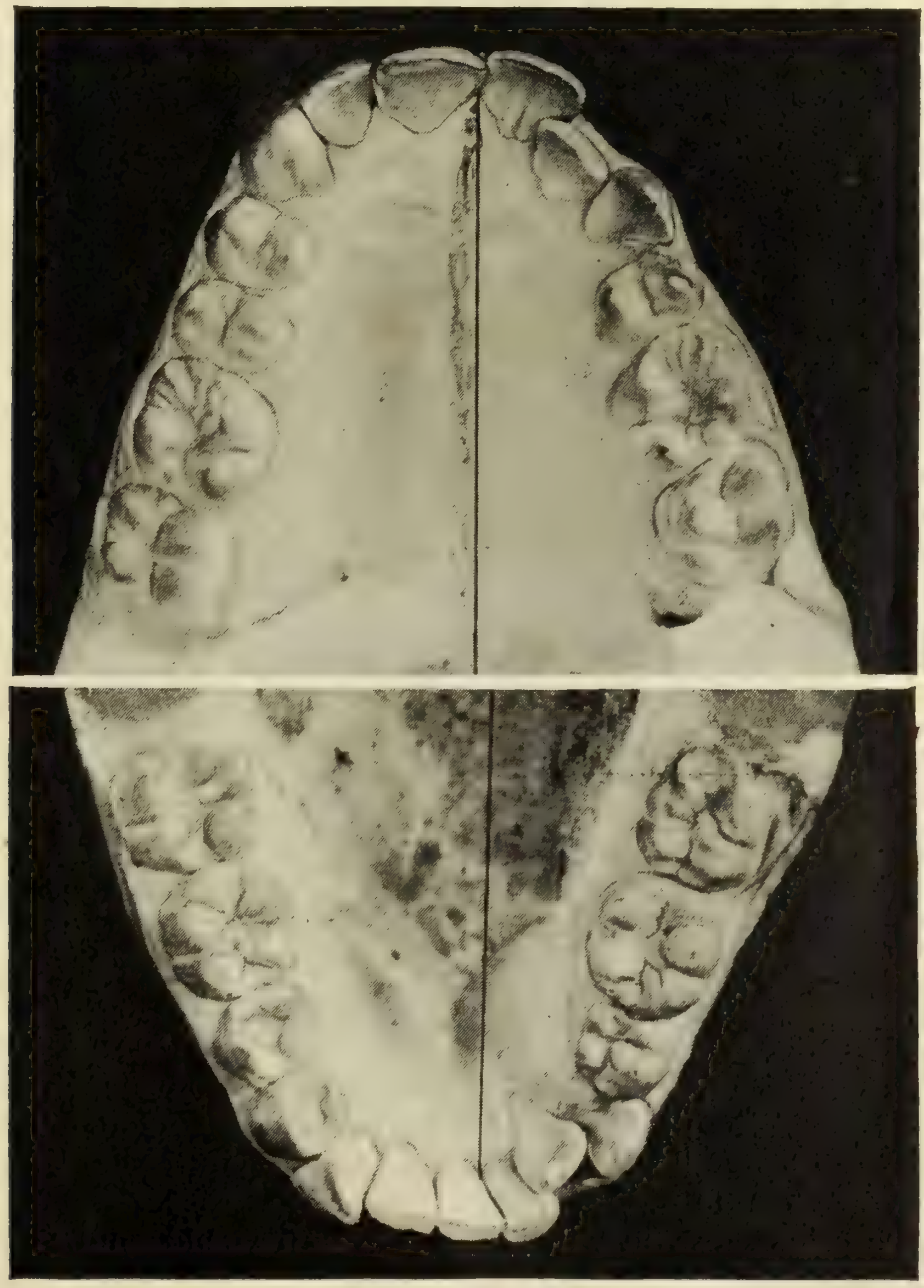
Shows an almost perfect set of teeth, excepting for the failure to erupt of the first left lower bicuspid. This failure to erupt produced the irregularity shown.

FIG. 12.



Shows a mouth where the right lower first bicuspid was extracted at thirteen years of age, with almost exactly the same results as are seen in the preceding case, No. 11.

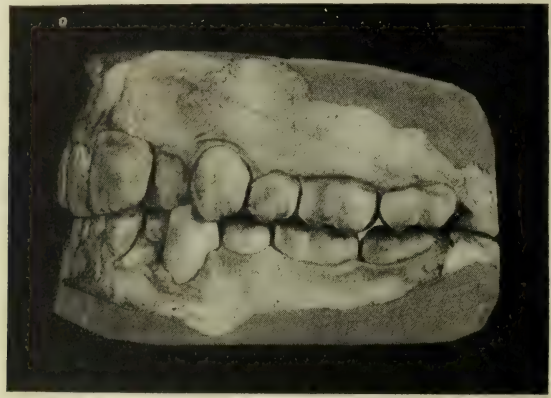
FIG. 13A.



Shows loss, five years ago, of upper and lower bicuspid on left side, causing great crowding of the teeth on the same side. Line from center of incisors backward shows great diminution in size of the mouth on the side where the extraction was practiced, lessening of the vault of the palate, flattening of the arches of the teeth on that side, so that the tongue has less room than on the other side, evidencing how extracting to make room diminishes the room and leaves greater irregularity than where extraction was not practiced.

Incidentally, let me call attention to the fact that the size of the dental arches being diminished by the width of one member in each of these cases gives that much less room for the free movements of the tongue, and to the critical observer that side of the face in each of these cases was noticeably smaller than the other. As illustrating this fact particularly, I present the drawing of a model made quite lately of a mouth from which two teeth on one side only were extracted about five years ago. The face is noticeably twisted, the speech is thickened very perceptibly, and marked irregularity and crowding exist on the side where extraction was practiced. Needless to say, mastication is seriously interfered with. Having consulted a number of dentists, the patient placed himself in the hands of some one, to me unknown, who evidently thought that as he was called in he had better do something, so he extracted two more teeth (Figs. 13A, 13B, and 13C).

FIG. 13B.



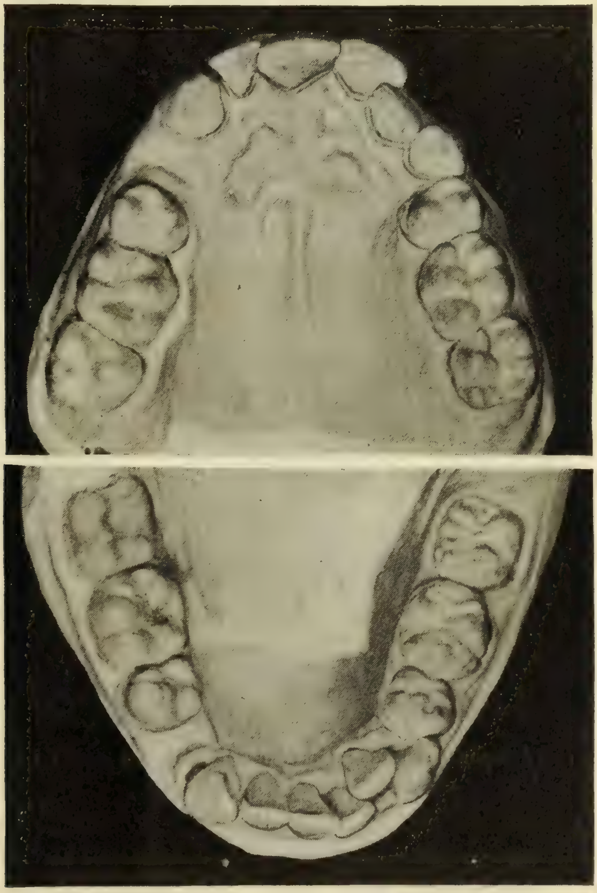
Side view of Fig. 13A, emphasizing the above conditions.

To illustrate still further the results of extracting even a bicuspid, I present six photographs of models of the same person taken at intervals of several years (Figs. 14A, 14B, 14C, 14D, 14E, and 14F).

These models show, first, the mouth open and closed as it was before anything was done; second, before and after the extraction of the two upper bicuspids; third, after successful efforts at spreading the arch and regulating had been made; and, fourth, a few years later, when the teeth are supposed to have acquired the positions that they are to retain.

This case lost, as you will perceive, the first bicuspid from each side above. The gentleman who regulated the case was justly proud of his results, which are far better than those usually attained under similar circumstances. He was surprised, however, when I called his attention to the fact that in the second models the second permanent molars had perceptibly advanced over the lower first permanent molars, and that the upper second bicuspid, toward which he supposed he had drawn the six front teeth, had advanced one-half the width of the lower bicuspid, while the upper cuspid remained in its position relative to the lower teeth, almost exactly where it was.

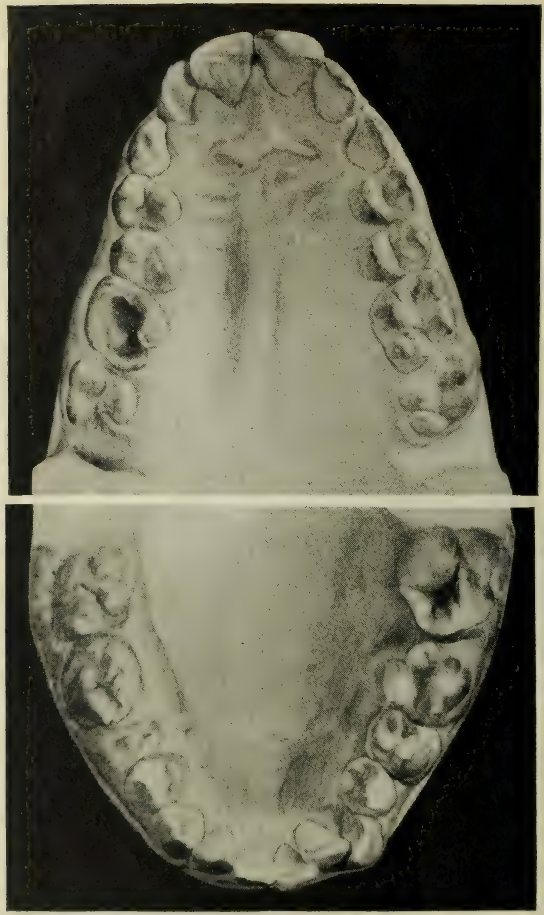
FIG. 13C.



Shows how a dentist, being called upon, imagined he must do something, and so mutilated the poor boy still further by extracting two more good teeth from the other side.

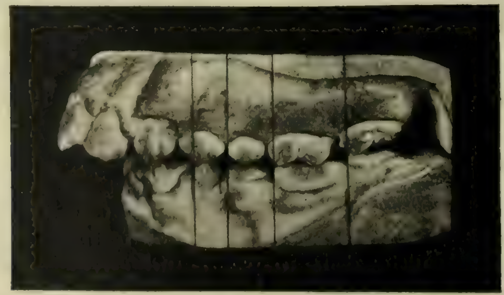
The third models show the second upper bicuspid standing exactly where the first bicuspid, which was extracted formerly, stood in its position relative to the lower teeth. The first permanent molar has followed it forward and covers a portion of the lower first permanent molar and second bicuspid, while the second permanent molar above, touching as it does the upper first perma-

FIG. 14A.



Shows the narrowed mouth, protruding upper jaw and teeth, and lower jaw to correspond.

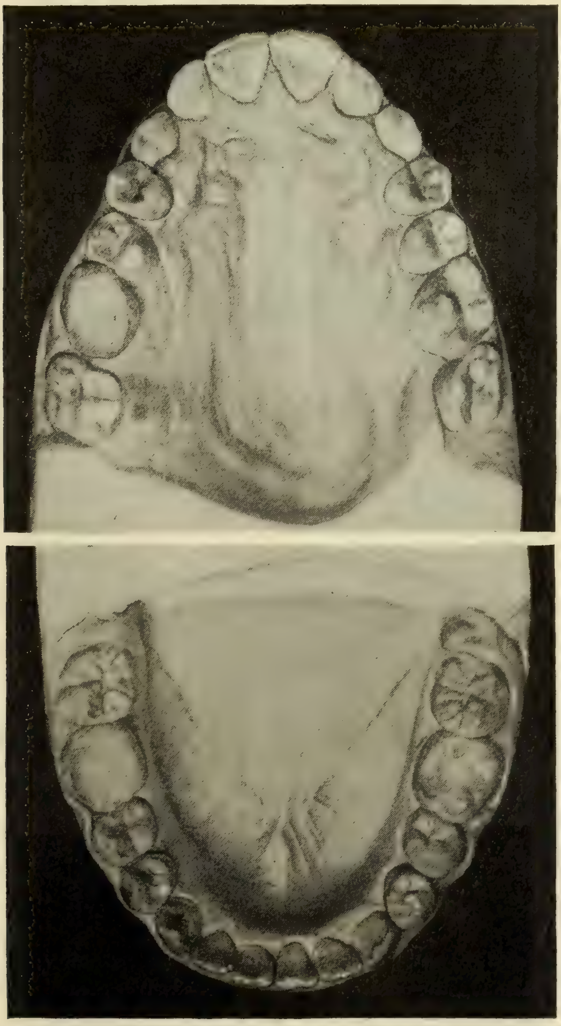
FIG. 14B.



Same mouth closed, lines indicating the relative positions of upper and lower teeth.

nent molar, has moved forward just the width of the first bicuspid which was extracted. Now, then, so far as the grinding teeth are concerned, what has been gained? Nothing at all, but we have

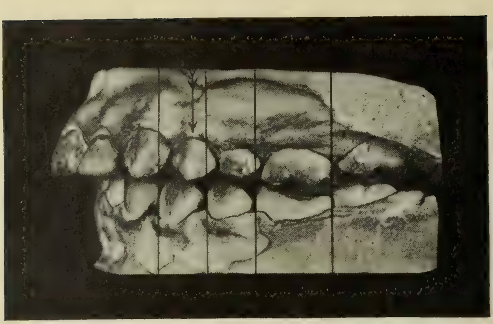
FIG. 14C.



Shows some expansion of the arches and also the extraction of the first upper bicuspid, which appears in the plaster model.

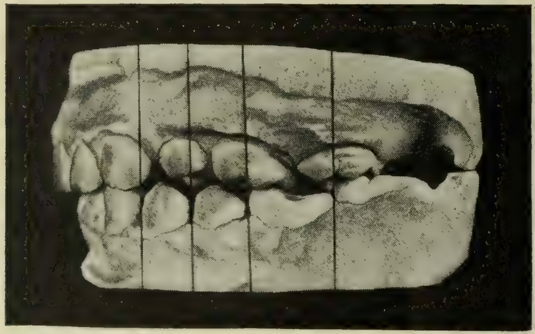
lost for life the more perfect occlusion and intermeshing of all the grinding teeth of this mouth. The only exception to this is in the case of the lower molars, in which fillings have been inserted which

FIG. 14D.



Side view of same, movement of upper molars distinctly shown, being both outward and forward.

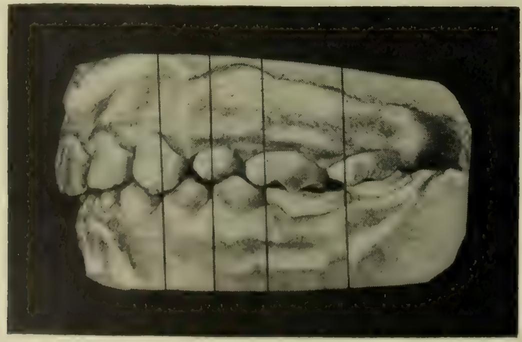
FIG. 14E.



Shows so great movement forward of the upper molar and bicuspids as to have placed the second bicuspid in the position formerly occupied by the first bicuspid, which was extracted, while the upper molars have advanced so much as to entirely fill the gap.

The upper cuspids having spread apart laterally, the four incisors have been drawn down to touch them, and so the prognathous condition of the upper jaw has been corrected, while the cuspid teeth occupy almost the same positions relative to the lower teeth that they did before; that is, they have not gone backward much, if any.

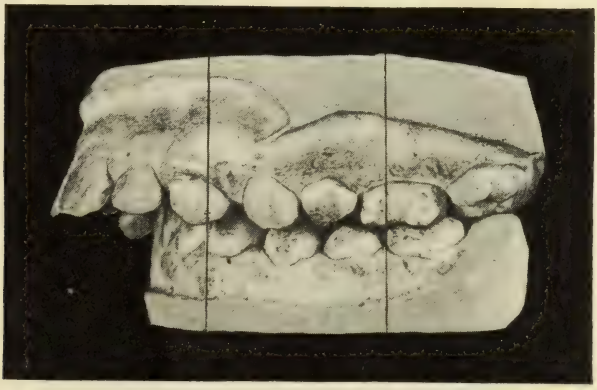
FIG. 14F.



Shows the same mouth after several years; the lines on these cases serve to mark any movement backward or forward.

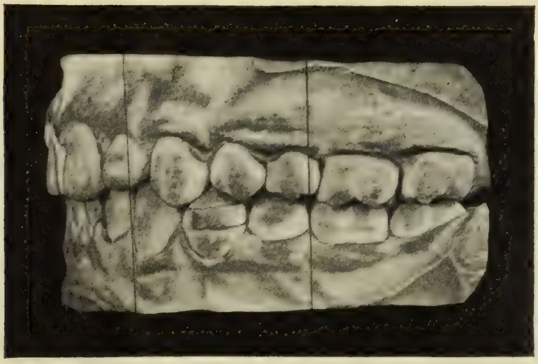
mesh as well as the teeth did before. To the casual observer everything is regular. To the critical observer, who makes models that we can examine from behind as well as in front, it is seen that mastication must henceforward be a stamping process, and not a trituration; and while it is true that the patient and the physician may not know what it is that causes ill health, who can say positively what the impairment of this function of mastication and insalivation may result in? Certain it is that the organs destined to prepare the food for assimilation have been very seriously impaired. But you may ask, and the gentleman who did the regulating did ask, How happens it that the upper incisors are placed in their proper position and remain so? The reply is very simple. The upper cuspids have been spread apart laterally, so that the arch formed by the cuspids and incisors has become a flattened arch instead of a high

FIG. 15A.



Shows the prognathous condition of the upper jaw when the patient was about **twelve** years of age.

FIG. 15B.



Shows the same case as it was two months later, without extraction, plus the **eruption** of the second molars, and as it remains to-day, nearly seven years later.

arch, and the cuspids and incisors now occupy the positions in which they belong. Furthermore, the bite is visibly shortened, and very considerably, so that a good portion of the lower incisors is no longer to be seen when the teeth are closed.

Fig. 16A.

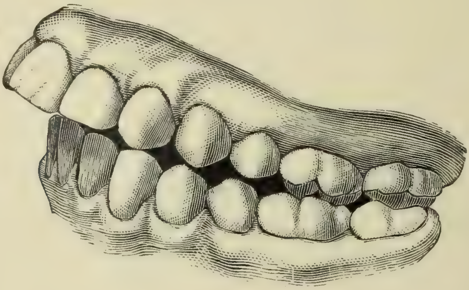
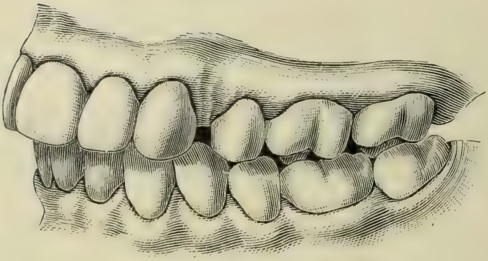
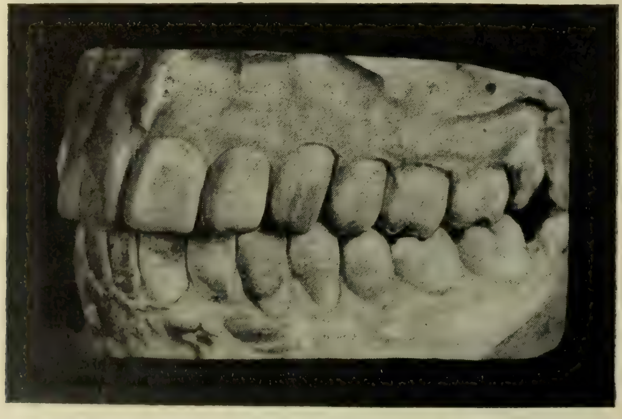


Fig. 16B.



The figures represent a case shown in the August Dental Cosmos, 1889, involving the extraction of the two upper first bicuspids.

Fig. 16C.



The same mouth, ten years later, 1899, the results being in no sense better than those in Fig. 14.

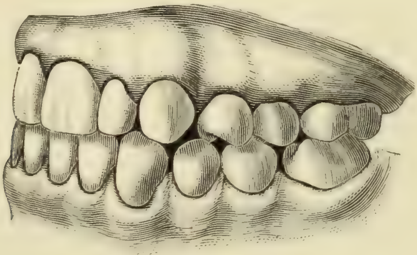
Now, to illustrate what can be done without extraction I present two other models coming from the same operator (Figs. 15A and 15B), the one taken nearly eight years ago, the other within a few weeks.

This case has been entirely regulated without extraction, and the regulation was accomplished in two months; so that the teeth have been in their present position for several years,—not far from seven, I believe. It will be seen that the upper molars in this case have actually been drawn back. The admirable results are before you.

A third case, which I present, also had the two first upper bicuspids removed and the upper front teeth drawn downward, spreading the cuspids somewhat (Figs. 16A, 16B, and 16C).

This regulation took place when the patient was fourteen years of age. The second model of this mouth was taken six years later. The lower incisors at that time leaned considerably forward, the lower cuspids were no longer upright; the first bicuspid leans so far forward that the tuberosity of the second bicuspid is below the tuberosity of the first, and almost the same condition exists between the molar and second bicuspid. The lower arch is distinctly made narrower, and yet it will be remembered that nothing has been extracted from the lower jaw, nor has any tooth been filed. The movement that we see in this case is entirely due to the change in occlusion, which has taken place since removing the natural support from in front of the second bicuspid above. We cannot see that the six upper front teeth have gone backward, but we do see that the upper back teeth have come forward; and in their coming forward the change in the lines of contact has been such that the upper teeth have driven the lower teeth forward also, and in that forward movement has occurred a distinct shortening of the bite to the extent seen here.

FIG. 17.



Represents a case of extraction of the second molars, and shows the same straightened lines, weakened bite, and shortened bite shown in Figs. 8, 9, and 10.

The third model of this mouth has been made within a few weeks, and is ten years later than the second model. A number of fractures have been sustained by the teeth at various points, owing to the malocclusion produced by those unfortunate extractions seventeen years ago.

The next diagram (Fig. 17) shows a straightening of the horizontal lines of the dental arches from in front backward, so that the concavity of the line of the lower molars and the convexity of the line of upper molars is scarcely, if at all, perceptible, restoring very much the style of occlusion of the temporary teeth.

Not only are these lines from front backward straightened by even the most successful results that can occur after extraction, but the curve from the center of the mouth between the incisor teeth back to the third molars is straightened and shortened so that the extraction of an upper and a lower tooth on one side of the mouth and not upon the other gives that side of the tongue less room, because the teeth tip toward the center of the mouth in the process of straightening the lines to such an extent as to noticeably deform the countenance (Fig. 13A).

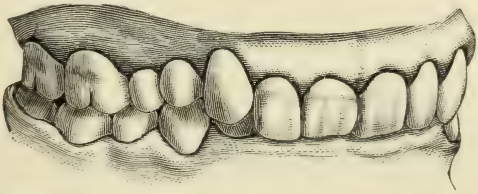
Further than to indicate these changes it is not worth while at this moment to enlarge, as each gentleman who chooses to preserve his models for a few years will see for himself these results more clearly than I could show them in the time at our disposal.

As these dental arches are straightened the diminution in the arch of the palate occurs, sometimes by failure to develop, sometimes by absorption taking place during nature's effort at repair, so that resonance of voice and distinctness of speech are forever gone. I have had the sorry experience put upon me of being consulted professionally by quite a number of young persons, especially ladies, whose aspirations as vocalists had drawn them to Paris, and to the most famous vocal teachers in that capital; and every one, without exception, who lost teeth previous to the time at which cultivation of the voice ought to have begun failed when they came to make their *début* as singers, notwithstanding the years which they had put to cultivation of the voice. On the other hand, I have been consulted by a few of the most noted vocalists, and, beyond some slight irregularities of the anterior teeth, the development of the permanent teeth had not been interfered with, either by extraction during their youth or by serious irregularities in any of the cases that I have seen or known about, notwithstanding the fact that two of them in their adult life came for artificial substitutes.

With this diminution of the arches and straightening of their curves comes (fourth) a shortening of the bite that causes an approximation of the nose and chin more than is normal. Ten years ago I undertook to express this idea in a discussion with a professional friend, who presented for our inspection some models of the same mouth before and after the extraction of certain teeth, and asked me if the models after extraction did not show a lengthening of the bite considerably greater than what existed before extraction. I replied, "Yes, the bite is longer since extraction, but the bite is not as long as it would normally have been had the extraction not been practiced;" and to give an ocular demonstration of the truth of this assertion I presented, and now present again, the diagram of a mouth in which certain of the deciduous teeth still remain. (See Figs. 1 and 2.) You can see the level at which there were baby teeth on a straight line, while the level to which the permanent teeth have arisen in their curve upward and backward since the advent of adult life is before your eyes and needs no argumentation. Object lessons speak loudly.

You will perhaps permit me to refer very briefly to two or three cases in practice. First, that of a lady, perhaps thirty years of age, who, having lost her first permanent molars, had the bite so shortened that when the teeth were shut the lower incisors were not at all visible, but were engaged in biting the upper gums just back of the upper incisors to such an extent that the mouth was constantly sore and giving pain. The molars and bicuspids were all wedged apart, and approximal fillings were put in that knuckled, by this means preserving permanently in a measure the spaces that had been gained by wedging. This process lengthened the bite sufficiently to free the gums from the contact of the lower incisors, and has remained an efficient remedy for twenty years (Fig. 18).

FIG. 18.



Shows, as a result of extracting the first permanent molars, the bite so shortened that the lower incisors wounded the roof of the mouth whenever the teeth were shut. Wedging the teeth apart and inserting contour fillings has given relief for twenty years past by opening the bite enough to clear the gum. (From August DENTAL COSMOS.)

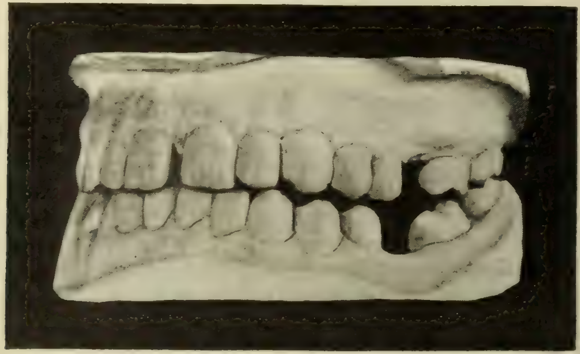
The second case is myself, having had my lower incisors three times shortened because of impingement upon the edge of the upper. About a dozen or fifteen years ago I put a large wedge between the first bicuspid on the right and the first molar, in the space formerly occupied by the second bicuspid, extracted when I was about twenty years of age. I wedged these two teeth about a month for the purpose of restoring the contact in the arch which had been broken so many years before by the extraction of that one tooth. I raised the bite by this wedge to such a degree that the incisors no longer touched. I put in a brace, which I still wear, and the occlusion has never since been strong enough to annoy me.

My third case is that of an assistant, who had a wedge placed between two lower molars one summer. There was no time to fill the tooth. The wedge was retained and renewed daily. The assistant crossed the ocean. Upon arriving in Paris the upper molars were found to be separated sufficiently for four or five thicknesses of tape to be passed between them. This movement was caused by the action of the lower cusps upon the upper.

Following upon this shortening of the bite, which means closing the jaws closer together because there is not enough tooth-substance to hold them apart, comes the impinging of the lower incisors upon and against the tuberosity of the upper incisors. This leads much more often than is generally supposed to the fifth result mentioned above,—namely, the separation of the upper incisor teeth. These incisors are frequently driven forward and apart in middle life, and sometimes earlier; so that unsightly spaces are formed, and sometimes so largely that the upper incisors project to such a degree that closure of the lips is difficult, if not impossible. I show in illustration Fig. 19, the case of a young lady only about eighteen years of age, whose incisors are largely separated from this cause.

With this separation of teeth from one another, whether it be separation of incisors or of molars, comes the sixth result mentioned,—namely, exposure of the gums to the contact of hard or fibrous particles of food in the act of mastication. We who watch over our patients from a professional, that is, an ethical, standpoint will notice that this exposure of gums leads to my seventh result, the prevention of thorough mastication; firstly, because of the pain or discomfort which these hard and fibrous bits occasion, and, secondly, because the occluding surfaces of upper and lower grinding teeth do not mesh, and therefore render thorough trituration of the food impossible. We are sometimes called a nation of dyspeptics, and the fault is frequently ascribed to bad cookery. Perhaps it might be as well to ascribe some of it to our bad dentistry, which, instead of honestly and faithfully conserving all of nature's powers, often, through indisposition to exert personal effort, or from lack of careful consideration, destroys masticating power, and so sacrifices the best interests of the patient for the sake of a fee that ought to put to confusion him who receives it.

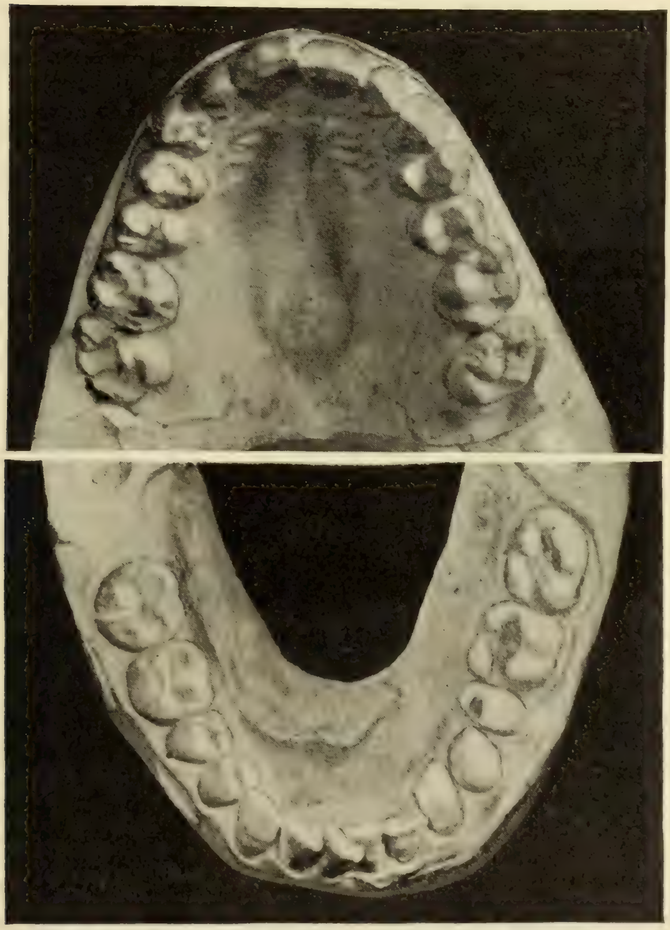
FIG. 19.



Shows the upper central incisors driven apart by the undue pressure of the lower incisors brought into contact with the upper teeth by the extraction of four molars.

My eighth result mentioned the wearing down of cusps. In those cases where the happiest results are reached that are ever seen after extraction I have seen greater wear of the cusps at twenty or twenty-five years of age than ought to be found at fifty or sixty. Figs. 8, 9, and 10 show wear, separation of teeth, shortening of the bite, fracture of teeth, diminution of the dental arches and the arches of the palate, a loss of dignity of expression, and yet they are all successful cases, so-called. These results are shown plainly enough to those of us who will take the trouble to make and study plaster models of our patients' mouths. These same students of the plaster models will also see my ninth result, fractures of the teeth at points of malocclusion. These breakages only occur later in life, when the changes that are constantly taking place by the movements, wear, decay, and deterioration of the dental organs have progressed beyond the point at which they were when the extractions took

FIG. 20A.



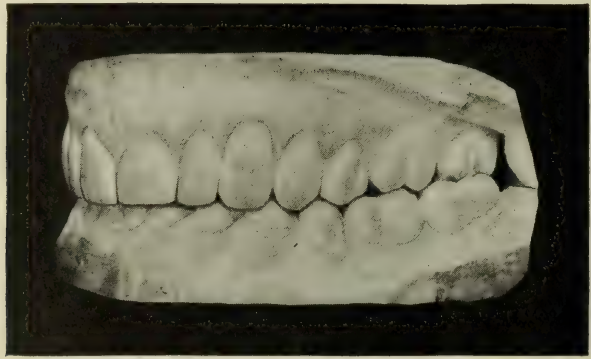
Shows the lower incisors driven inward and the circumference of the mouth diminished by the extraction of the first permanent molars. Decay is constantly recurring from the crowded condition of the teeth that have been repeatedly filed apart to get room after the failure to make room by extracting. Certain localities also, being inaccessible to the brush, are very prone to the deposition of tartar.

place. We all have seen, and some of us have wondered why teeth so frequently break of themselves, perhaps when the patient is eating mush and milk. I especially call attention to this one cause of these breakages, as it seems to be the cause of the larger proportion of them.

My tenth result from extraction is the greater liability to the deposit of tartar. This arises sometimes from the lower incisor teeth being caused to incline inward instead of outward, as they ought; in which case it is made difficult, if not impossible, to effectually guard against the deposit of tartar or of food (Fig. 20A).

The back teeth after extraction almost always incline forward toward the cuspids, which leaves a triangular space or spaces, generally very difficult to clean. We must notice therefore the greater liability to a profound deposit of tartar on teeth where the horizontal arches have been disturbed by extraction or other cause. Clinical observation shows that a deposit of tartar is much more frequent and goes deeper, even to the forming of calcic abscess on the sides of teeth, abutting upon the region or space left by the extraction of a tooth.

Fig. 20B.



Shows the shortened bite of the same mouth, forming an occlusion very liable to fractures.

Approximation of grinding-surfaces favors such deposit; not only by forming a nidus of tranquillity for the oral fluids, but by preventing that trituration which tends to cleanse the teeth of food or other deposit.

Once more referring to my own case, the extraction of the second upper bicuspid led to a deposit of tartar between the lateral incisor and the cuspid which, twenty years after the time of extraction, became so troublesome that one or two calcic abscesses formed. It was because of this condition that I inserted the wedge alluded to earlier in this paper, wearing it a month and driving the teeth of the upper arch tightly together, where they have since been retained by the brace which I wear. From that time to this I have not been troubled by the further deposition of tartar on this lateral incisor.

The eleventh result is the withdrawal of the normal support of the teeth constituting the arch, with the consequent destruction of a portion of the support of the normal socket.

My twelfth result of extraction may seem anomalous,—an undue crowding where teeth touch each other while leaving spaces between those teeth where the occlusion of the antagonizing teeth permits spaces to occur. It is generally supposed, and I think almost always said to the patient, that extraction is done to make room. So far from making room, room is diminished, and what room remains is crowded; not only by teeth touching too forcibly,—where they touch at all,—but by their inclining inwardly toward the tongue. If a few years after extracting teeth we could take impressions of the same mouths we should invariably find that room had been lost, not made. (See Figs. 8, 9, 10, 13, 18.)

The thirteenth effect is the rotation on their axes of teeth posterior to the extraction, which always gives a bad occluding surface to the antagonizing tooth in the opposite jaw.

My fourteenth result has been substantially covered in the twelfth, namely, the diminution of room for the tongue, and the frequent production of thickness or lisping in the speech subsequent thereupon.

Lastly and finally, my fifteenth result has to do with those changes that have been before alluded to, that effectually destroy the power of supreme vocalization by diminishing the boundary lines in which the vocal organs must necessarily act, so that the clergyman, the actor, the singer, the forensic lawyer are, in their greatest perfection, all impossible where the hand of the extractor has been at work.

I am sure that if my professional brethren will study the results of extraction as I have been compelled to study them, from the failures that have resulted through extraction, their practices can certainly be made so conservative that they will never extract unless the good to be gained will surely and greatly overbalance the injury that is sure to be done. A very slight examination of the *drawings of models* published to illustrate Dr. Mitchell's paper in the DENTAL COSMOS for June, 1899, shows nearly all these results as having occurred in his cases.

If the fillings required in the number of years that have elapsed since the extractions are so few, surely it shows that the structure of the teeth as a whole was so good that had the defective teeth been properly repaired with the skill which I know Dr. Mitchell to possess, the probabilities are that the masticating organs could all have been easily preserved and the patients been saved from the necessity of limping through their victuals for the rest of their lives.

SOME VERY RARE CASES OF GUNSHOT AND SPEAR WOUNDS IN THE TUSKS OF ELEPHANTS.

BY W. D. MILLER, D.D.S., M.D., BERLIN, GERMANY.

ALTHOUGH as early as 1840 Owen ("Odontography," 1840-41) remarks that the appearance of foreign bodies in solid ivory had long ceased to be a cause for wonder, yet even up to a very recent date the views of different authors in respect to the reparative processes that took place, especially in the case of gunshot wounds, were by no means coincident. Haller ("Elementa Physiologiæ," pars. sec., pp. 51-55, 1767) expressed the view that ivory possesses the power of secreting a fluid out of which new dentin may be deposited, and that in this way any loss of substance may be repaired. Blumenbach ("Vergleichende Anatomie," 1804, third ed., 1824) also inclined to this view; while among recent authors Heitzmann and Bödecker (*Independent Practitioner,* 1886, p. 122) appear as the chief exponents of the theory that ivory, as well as human dentin, has the power of undergoing inflammatory processes, and of repairing defects quite independent of the pulp and the pericementum. Also Busch, as late as 1887 (Trans. International Medical Congress, Washington), expresses the opinion that the *dentinal fibrils* possess the power of depositing new dentin, and so even of closing up a canal made by a bullet in ivory.

In the DENTAL COSMOS (May *et seq.,* 1890) I entered into an exhaustive discussion of the pathological processes which occur in the tusks of elephants, and especially of the processes resulting from gunshot and spear-point wounds. In regard to the latter, I classified the cases which had come under my observation as follows:

1. *The ball strikes the free portion of the tooth and glances off* without reaching the pulp. Such wounds never show any tendency to heal; the surface, however, becomes smoothed off in the course of time by friction.

2. *The ball or spear-point strikes the tooth outside of the alveolus and remains fixed, without, however, penetrating to the pulp.* In this case also the wound does not close, nor does it show the least tendency to do so.

3. *The ball, having passed through the alveolus, penetrates the wall of the tooth, reaching the surface of the pulp, without, however, escaping from the tooth-wall.* The wound in the tusk is here closed from without with cement, while the pulp coats the surface of the ball with a layer of modified ivory more or less irregular in structure, depending upon the amount of irritation to which the pulp has been subjected. (See Fig. 27, DENTAL COSMOS, 1890, p. 513.)

4. *The ball passes through the alveolus and wall of the tooth and lodges in the substance of the pulp.* The opening in the wall is closed by a formation of cement, in which we occasionally find an intermingling of dentin. The ball becomes encapsuled first by a layer of osteo-dentin of varying thickness, afterward with regular ivory. (See Figs. 29-31, DENTAL COSMOS, 1890, p. 515.)

5. *The ball passes through the alveolus, the wall of the tooth, and the pulp, imbedding itself in or being arrested by the opposite wall.* In this case, again, both the pericementum and the pulp take part in the healing process, the former closing the wound externally, the latter internally. (See Figs. 33, 34, loc. cit.)

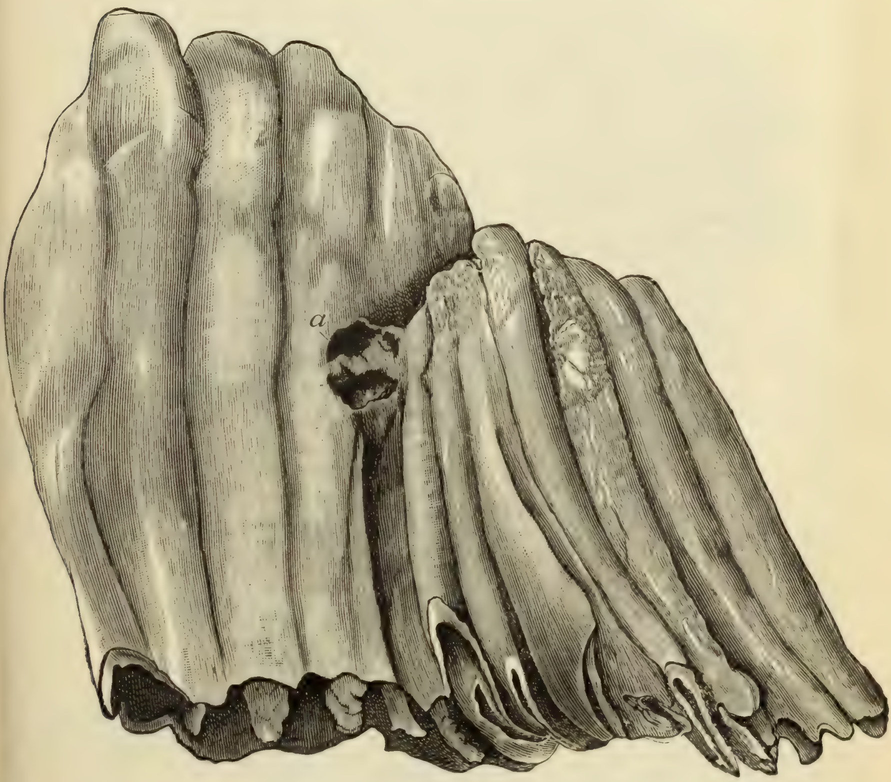
6. *The ball passes completely through the base of the tooth and escapes at the opposite side.* (Figs. 35, 36, loc. cit.)

7. There remains to be considered the case where the hunter from a tree shoots or drops a weighted spear upon the animal. The ball or spear *may* in such cases pierce the floor of the nasal cavity and enter the open base of the tusk, which is here directed almost

vertically upward, without anywhere touching the wall. Spear-points seven inches long have been found in ivory, lying parallel with the axis of the tusk, whose presence and position can be accounted for only in this way.

In my publication I accounted for all processes of reparation in ivory solely by the activity of the pulp and pericementum, and excluded all action on the part of the ivory itself. Since my publication a large number of specimens, collected by Busch and myself, have tended only to substantiate my views. This article is therefore presented not so much because new points of view have arisen or new discoveries been made, but rather for the reason that I have in my possession a few specimens which are of such extreme rarity that they cannot fail to be of interest to all students of dental science.

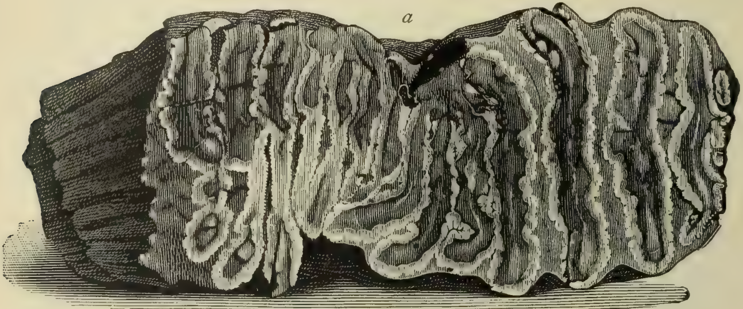
FIG. 1.



Third molar of an Indian elephant, with leaden bullet at *a*. ⅔ natural size.

The first preparation (Fig. 1) is a third lower molar of an Indian elephant, containing a leaden ball. The ball having passed through the alveolus, penetrated only superficially into the tooth, which at the time was unerupted. Yet the force of the blow was sufficient to almost completely rupture the tooth and distort the shape of the plates, which at the time were in process of formation. In the cross-section (Fig. 2) the distortion of the plates is distinctly visible. Despite this fact, the process of reparation seems to have taken place without any interruption, since there is no abscess-cavity to be found and nowhere any appearance indicative of suppuration, so commonly met with in tusks after gunshot wounds. The ball itself is also perfectly inclosed in cement of normal structure, while even a deposit of cement has occurred upon its outer surface.

FIG. 2.

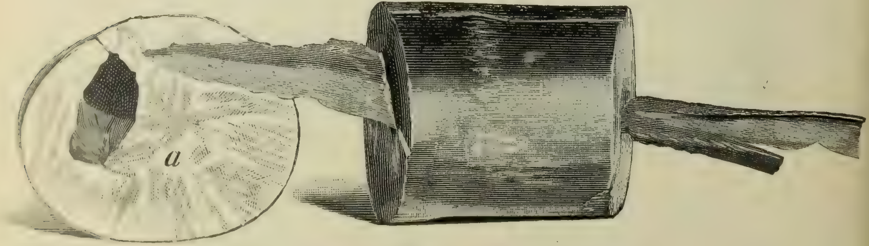


Cross-section of tooth shown in Fig. 1. ½ natural size.

I believe only one other case of a molar of an elephant showing a gunshot wound has as yet been described, and that by C. S. Tomes (Trans. Odontological Society of Great Britain, 1877, p. 89).

The second preparation (Fig. 3), although not quite so rare in kind, is still none the less remarkable, and, indeed, I think it may be considered to be even more so. We have here a spear-point about eleven inches long and one and a half inches broad at the broadest point imbedded in the tusk so as to cut the axis of the tooth at a very acute angle. I have only a photograph of this case, the preparation itself being in the possession of a London merchant, who was not willing to part with it for less than five hundred dollars. With the help of my friend J. Howard Mummery I succeeded in obtaining the loan of the preparation, and Mr. Mummery made a photograph of it for me.

FIG. 3.

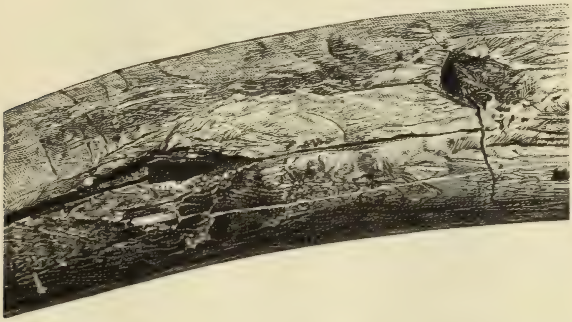


Section of a tusk with spear-head. ⅓ natural size.

Short spear-points, about an inch in length, are frequently met with sticking in the surface of tusks, and I have described two such cases in the DENTAL COSMOS, 1890, Figs. 24, 25, p. 512. The ivory in their neighborhood shows no reaction whatever. Combe (Philosoph. Trans., 1801, p. 165) described a case where a spear-point three inches long was met with in a tusk, and Murie (Trans. Odont. Soc., 1870, p. 281) a case of a spear-point seven and a half inches long. Another preparation is said to be in the museum of the Royal College of Surgeons, London.

In these cases we must suppose that the spear entered the base of the tusk in the manner described above under 7. In the present case the spear in the greater part of its length was inclosed in solid ivory, which, in consideration of the size and roughness of the body and the laceration which it must have produced, testifies to a wonderful tenacity and power of repair on the part of the pulp.*

FIG. 4.



External view of tooth-section, with point of entrance of the two balls. ½ natural size.

In the third preparation (Figs. 4, 5) we have the comparatively rare cases in which two bullets are found in the same section of a tusk. In the DENTAL COSMOS, 1890, p. 514, I have already described and illustrated a case in which an iron ball and a bent-up nail were found partially imbedded in ivory on the inner wall of the tusk. A second preparation with two balls is contained in the collection of the Dental Institute of Berlin.

In the present case we have the point of a tusk fourteen inches in length, with a diameter of two and a quarter inches at the thicker end. In a section of the same (Fig. 4) may be seen the point of entrance of the two balls, in Fig. 5 the two balls *in situ*. In the case of the ball nearest the point of the tusk the wall was very much lacerated, whereas the other ball *(a)*, which penetrated the tusk at the border of the alveolus, where the wall was about eleven millimeters thick, produced but a slight fracture, and the canal made by the ball was comparatively smooth.

We have here a case, not included in the classification given above, where the ball strikes the free portion of the tusk (*i.e.*, outside of the alveolus), and, completely piercing the wall of the tooth, enters the pulp. The canals, which in cases where the wound is within the alveolus are usually closed with cement, here remain open, or are only partially closed by the pulp from within.

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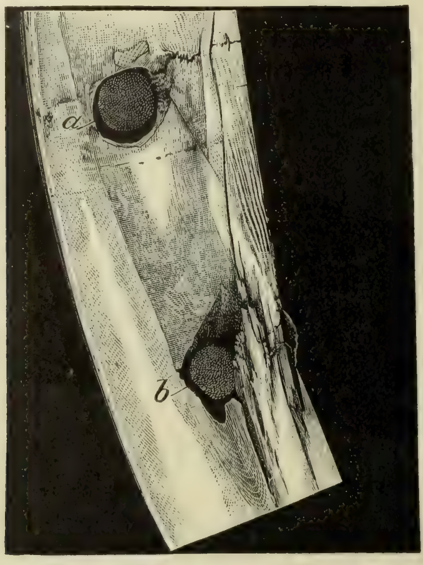
*It is to be supposed that the shaft remains attached to the spear-head and projecting above the animal's head until violently broken away by being caught in the branches of trees or in the underbrush, which in all probability causes more laceration and bruising of the pulp than the first piercing by the spear-point.

Neither ball is firmly imbedded in the ivory; iron balls as a rule seem to cause more disturbances in the surrounding pulp-tissue than leaden ones. The ivory formed subsequently to, or the size of the pulp at the time of, the wound is clearly visible in the section (Fig. 5). Just above the ball *a* we see a small piece of the tooth-wall which was driven into the pulp by the ball. The ball *b* lies in a comparatively large cavity, a correspondingly large portion of the pulp having here been destroyed by suppuration. There is no indication whatever of a reparative process having taken place in the shattered wall about *b*, such as might have been expected if the dentin were capable of repairing itself.

FIG. 5.



Longitudinal section with balls *in situ*. ½ natural size.

A NEW TREATMENT FOR EMPYEMA OF THE ANTRUM.

BY C. H. NICHOLSON, D.D.S., ROCHESTER, N. Y.

(Read before the union meeting of the Seventh and Eighth District Dental Societies of the State of New York, October 24, 1899.)

IT is altogether unnecessary and is not my intention to occupy the time of the members of this convention by dwelling on the anatomical features of the region concerned, nor refer to the etiological conditions involved in empyema of the antrum of Highmore, but to come at once to my subject.

The preparation referred to in my title is protargol. I have called it a "new treatment" because while it has been on the market for a couple of years and has been used in general practice as a bactericide, especially in urethral troubles, to some extent in ophthalmic, and latterly in auricular practice, it has not heretofore, as far as I can ascertain, been introduced into the field of odontological therapy.

In addition to its efficacy I am glad to recommend its use for the reason that it permits of a conservative line of treatment and the avoidance in many cases of radical operations, such as entering the antrum through the canine fossa, etc. In the cure of this troublesome disease, which I fear is too frequently passed over unnoticed by the general practitioner, or if it is forced upon his attention, the patient is too often referred to a nose and throat specialist for the cure of a trouble distinctly within the province of the dental surgeon.

Protargol is a silver proteid. A yellowish light powder easily soluble in water, forming a brown liquid, dark according to strength, of neutral reaction, and unaffected by exposure to air, heat, or light. It is somewhat similar to argonon, but differs in that it contains twice as much silver as argonon (eight and three-tenths per cent.) in firm organic combination, and is not precipitated by albuminous or sodium chlorid solutions, has extraordinary penetrating power, and is non-irritating. Solutions of from two to twenty-five per cent. have been used in genito-urinary diseases, and five per cent. for affections of the eyes.

In 1897, I believe, Dr. Benario, of Frankfort, after long bacteriological experimentation, first introduced it in his practice in the treatment of urethritis, due to the presence of gonococci. The results, which exceeded all his expectations, induced him to send the preparation to Professor E. Neisser, of Breslau, who had similar success. Both of these gentlemen reported their experience to the profession, and it soon came into general use in Germany, and later in this country, until it is now considered a specific in such troubles. Dr. Ed. S. Peck, visiting ophthalmic surgeon to the City Hospital, New York, in a paper read before the New York Academy, December, 1898, cites a number of cases of his specialty successfully treated by this remedy.

My attention was called to it by a personal friend, a specialist in nose, ear, and throat troubles, who had read of it being used in the middle ear with success. I immediately obtained a supply and used it in a case of empyema of the antrum I was then treating, which had proved unyielding to the usual methods of treatment, with the most surprisingly satisfactory results. My experience with this case may be best noted in the following report:

A young man, George N., aged twenty-eight years, was brought into my office by a prominent surgeon of one of our leading hospitals, for examination, giving the following history: He had a carious tooth, upper right first molar, which had been troubling for some time, attended with fullness in the superior maxillary region, serious pain in the orbit with protrusion, frontal headaches, and some alveolar enlargement. Attracted by the glaring advertisement of one of our numerous "Dental Parlors," he called and consulted the proprietor, who attempted the treatment of the tooth for alveolar abscess, which was continued for some days without success, and, the trouble becoming more aggravating, extraction was resorted to and the patient dismissed. Two days later he visited the parlors again, with pus and blood discharging freely from his nose and mouth. The proprietor was much alarmed, and told the young man he was likely to lose the side of his face, and advised him to consult the best doctor he could find. He went to the hospital referred to, was examined, given some medicine, but went back the next day worse than ever; at this call he was seen by the chief surgeon, who at once brought him to my office for examination as stated above.

I found the alveolar process and floor of the antrum considerably fractured, with some necrosis, the membranous lining badly inflamed and highly painful to the touch of the probe, especially in the orbital region, but a large roomy cavity was presented particularly free from bony septa, having a free opening into the middle meatus of the nasal cavity. There was a liberal discharge of pus from the nose and alveolus, with a disagreeable odor and other characteristic symptoms. I of course diagnosed empyema of the antrum, and the surgeon kindly turned the case over to me.

Treatment was begun after removal of all necrosed bone, by douching the cavity with six ounces of a two per cent. solution of sodium chlorid, followed with eight ounces of a ten per cent. solution of peroxid of hydrogen and a saturated solution of boric acid twice daily. This was continued for six days, with the result that the discharge was considerably lessened, the odor, headache, etc., had disappeared, and the patient generally more comfortable. These injections were all introduced warm with a Eustachian catheter through the alveolar opening, free vent and drainage being obtained through the right nostril. I might say, in passing, that while all peroxid preparations are reported to be neutral, I found them strongly acid and very irritating to the mucous membrane in its then inflamed condition, especially Marchand's, Oakland a little less so, and McKesson & Robbins's three per cent. pyrozone the least of the three I tried. I found by using pyrozone I could increase the strength of the solution to fifteen and twenty-five per cent., and substituted the boric acid after the sixth day with Gilmore's germicide, which depends on formaldehyd for its antiseptic properties, had the patient call once a day, and directed him to procure a suitable bulb syringe and wash out the cavity with the boric acid solution two or three times daily. This I continued for a period of twelve days with a not very marked change in the character or quantity of the discharge, when I received the information of protargol as above stated.

After securing a supply of it, the cavity was thoroughly washed out with the saline and pyrozone solutions and about two drachms of ten per cent. solution of protargol was injected, letting as much of it as would remain. The patient was directed to call again in five days, and to continue the boric acid injections after forty-eight hours. On his return I was delighted to find a marked change for the better in all the remaining symptoms. The treatment was repeated and he was directed to call again in a week, when, after the most careful examination, I could find no trace of pus or any symptoms which had been present. I repeated the treatment, however, as a safeguard, reducing the strength of the protargol solution to five per cent., directed the patient to keep the alveolar opening thoroughly cleansed and allow it to heal, and dismissed the case. After the injection of the ten per cent. solution of protargol, the young man complained of a severe headache which continued several hours; if you will shake the bottle containing the sample presented, you will notice it filled with foam like soap-bubbles, and I am of the opinion that the distress experienced was due to the pressure caused by this rather than to any irritation from the drug itself; still, perhaps, a five or seven per cent. strength would answer as well.

I regret that my experience with this preparation has not covered sufficient time before the date of the convention of these societies to confirm the above satisfactory results with the citation of other cases, but if it will cure one obstinate case in two treatments it will doubtless prove of great advantage at least in all similar cases, and I recommend it to your consideration. I am also of the opinion that it will be found extremely valuable in alveolar abscess, and, although I have several cases under treatment, I am not at present prepared to report definite results along this line.

I can at least remove one objection to its use which at once occurred to me, that is discoloration of dentin. I have saturated pulp-chamber and canals of recent teeth with a ten per cent. solution, but find no discoloration, such as follows the use of silver nitrate.

Dr. Benario, in the published report of his experiments to ascertain the bactericidal power of protargol, states that fresh cultures of Staphylococcus pyogenes were killed by a two per cent. solution in twenty minutes, and those of the sixth generation were killed in fifteen minutes by a 0.5 per cent. solution, and the action was more rapid in bouillon and serum than in sterilized water. So that I have strong hope that protargol will be found a most effective remedy in alveolar abscess and many other branches of our field of operations.

CORRESPONDENCE.

THE INTERPRETATION OF FACTS AS ILLUSTRATED BY DR. WILLIAMS.*

TO THE EDITOR OF THE DENTAL COSMOS:

Sir,—When I read my paper at Niagara last August, on "Physiological Reasons for Supposing that Dentin and Enamel in Pulpless Teeth may be Nourished," I was much disappointed to find that Dr. Williams was not to be present, as I knew that the paper was adverse to theories held by him, and hoped that a personal discussion might be confined to the essential points and not drift to side-issues and misinterpretations, as is so apt to be the case in journalistic debates.

My paper was published in the October number of the DENTAL COSMOS. Dr. Williams has very intelligently criticised the paper in an editorial of *The Dentist,* October 19, a London magazine of which he is the editor.

In the course of this criticism he writes as follows: "Dr. Head states some interesting facts, but we beg to doubt if all the inferences suggested by him from these facts are really warranted. Briefly stated, Dr. Head has found marked indications of sensitiveness in dentin six months after the removal of the pulp from a molar tooth. The pulp, he says, was removed up to the extremity of each root of the tooth. Dr. Head's interpretation of this fact is that nutritive molecular changes may take place in both dentin and enamel of pulpless teeth. This is a somewhat startling conclusion, and one which would, if demonstrated to be true, very completely upset the most advanced teaching concerning cell physiology. Let us carefully examine Dr. Head's statement of fact and see what foundation we can find for his conclusions.

"It so happens that the writer [Dr. Williams] has a tooth much in the same condition apparently of that of the patient mentioned, but with this difference: in our case the pulp was removed twelve years ago. An attempt was made at the time of the removal of the pulp to enlarge the canals, but the tooth was so extremely sensitive to the cutting that the pulp-chamber and upper part of the canals (the tooth was a lower molar) were filled with cotton dressings saturated with iodoform, and the outer cavity stopped. Six years later the tooth was opened, the dressings removed, and a second attempt made to enlarge the pulp-canals, but again the attempt was abandoned because of the extreme sensitiveness. This sensitiveness was not in the least affected by the application of the usual obtundents. Two years ago the tooth was opened a second time, and with results similar to the former. At times this tooth has been very sensitive to heat and cold; in this respect also resembling the case mentioned by Dr. Head. The second time the tooth was opened was during one of these attacks of sensitiveness to heat and cold. The opening of the tooth gave instant relief, although the dentin remained as sensitive as ever to cutting. Cases are not infrequent in which a dead tooth is markedly sensitive to a slight touch, but free from sensitiveness to considerable pressure.

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* "On the Interpretation of Facts." Editorial in *The Dentist,* October 19, 1899.

"Dr. F. W. Hill, of Oxford, informs us that he has recently had a case in which the slightest touch of a steel instrument to an amalgam filling in a living tooth produced pain, and yet in the removal of this filling there was no pain after the drill had acted for a few seconds. After considering all of the facts which these cases present, we must conclude that, from the clinical point of view, there is no reason for assuming apparent sensitiveness of dentin to touch warrants us in concluding that nutritive changes are taking place in the tissue. We use the expression 'apparent sensitiveness' because no one has yet demonstrated that the real seat of sensitiveness is in the dentin.

"It is quite possible that the dentinal fibrils have no further function in this respect than that of conveying the molecular disturbance, caused by the cutting instrument, through to the terminal points of the nerve-fibers, whether in pulp or pericementum."

It is hard to believe that cut dentinal fibrils convey only molecular disturbance, and not true nerve irritation to the cementum and pulp, as the dentin of a tooth with a live pulp is markedly sensitive just beneath the enamel, while farther in toward the pulp it becomes less sensitive.

If dentin fibrils only carry molecular disturbances we should expect either equal sensibility along the entire fiber, or a steady increase of sensibility as the pulp is approached. But this is not the case, and we find in the marked sensibility of the fibril, just beneath the enamel, which sensibility decreases markedly as the cutting progresses toward the pulp, an example of exactly what would happen if the dentin fibrils really contained nerve-filaments too minute for the microscope to demonstrate, for nerve-fibers are most sensitive at their terminals.

I accept Dr. Williams's case of twelve years' standing as a much more marked proof that the fibrils of dentin can be nourished after the pulp has been destroyed. For while it is possible, but in my opinion not probable, that the aforementioned dentinal fibrils in the pulpless tooth only conveyed molecular disturbance to the nerve-terminals in the cementum, I hardly think they could have done this for twelve years unless they had received nourishment from the cementum through the interglobular spaces. The dentin in the pulpless tooth reported by me was sensitive to the touch of the finest broach, and was no more "apparently sensitive" than the dentin in a tooth with an irritated pulp.

That in the pulpless tooth of Dr. Williams the dentin was not in the least affected by the application of obtundents is an experience common to us all in teeth with live pulps. Would that we did have an obtundent that always acted. The fact that the tooth when sensitive to heat and cold, on being opened, gave instant relief, although the dentin still remained sensitive as ever to the cutting, is interesting, but not of especial importance, as the accumulation of gas and consequent peridental inflammation in cases of pulpless teeth are not unusual, and would also explain why in that particular case the application of dentinal obtundents was of no avail.

The case reported by Dr. Hill, where the slightest touch of a steel instrument to an amalgam filling in a living tooth produced pain, and yet in the removal of this filling there was no pain after the drill had acted for a few seconds, is, alas! a too common experience. A loose amalgam filling when touched rubs and irritates the sensitive dentin beneath, but when this filling is held firmly by a bur or jammed by metallic shavings the immobility thus obtained causes a cessation of the unpleasant but not extraordinary sensations, or pain, the result of galvanic action, is a common experience under the circumstances noted.

Dr. Williams takes exception to the expression "inflamed dentin." It was an error that was corrected when the proof of my paper was sent to me; I intended to say irritated dentin.

Dr. Williams also finds fault with my statement that the ultimate nutrition of all the cells in the body is performed by osmosis, but, although I did not deem it necessary to explain the entire process of nutrition, Dr. Williams certainly understands me when I so speak, just as I understand him when he speaks of a dead tooth being markedly sensitive to a slight touch. He means a pulpless tooth. A dead tooth could not and would not be allowed to remain in the mouth.

Dr. Williams sums up his article as follows: "It will thus be seen that the utmost which could be effected by the osmotic action referred to by Dr. Head would be the delivery of raw material out of which the substances necessary for nutrition might be elaborated by the cells of the tissues concerned. But, inasmuch as there are no dentin-cells in a pulpless tooth, and no enamel-cells in a completely formed tooth, whether the tooth be living or dead, there is not the slightest warrant for the assumption that nutrition can take place in dentin the cells of which have been destroyed, or in the enamel of a tooth after the disappearance of the enamel-organ."

The deduction that no new enamel-molecules can be secreted after the enamel-cells are destroyed is obvious; the deduction that no new dentin-molecules can be formed after the odontoblasts are destroyed it is not my intention to combat. But, as Dr. Williams so beautifully illustrates, nutrition is a very complicated process. Purely chemical forces enter into its process quite as much as does cell life, and this chemical activity may be entirely independent of cell life.

The dentin- and enamel-molecules, as Dr. Williams says, are very complex, but, while no new molecules can be formed in the absence of ameloblasts and odontoblasts, we have in fossil sharks' teeth an example and a proof that hardening changes in enamel and dentin can occur when the formative cells are destroyed.

The white coral rock of Bermuda is formed by animalcules, and although no new deposit of rock is possible when it is removed from the water, nevertheless this rock, on exposure to the atmosphere, from being soft becomes very hard. In the same manner formed enamel-molecules may, and, according to clinical experience, do, undergo a hardening change in the course of years that makes old enamel denser than young enamel.

The same may be the case with the dentin-molecules, which, in the absence of odontoblasts, may become harder by accepting quantities of salts too minute for chemical analysis to recognize. For chemical analysis, as Dr. Williams admits, is not able to solve the exact composition of enamel and dentin to the extent of deciding whether they contain one or more molecules. The most careful chemical analysis, when applied to such highly complicated organic structures, must stand convicted of inefficiency, and doubly so when structural characteristics are considered.

Thus no cell doctrine seems to be assailed when I claim that Dr. Williams's case, to my mind, proves that pulpless dentin, as far as its dentinal fibrils are concerned, may be nourished and kept alive for years by osmosis from the cementum through the interglobular spaces.

To sum up, the fossil shark's tooth takes on its stony hardness without the intervention of the enamel or dentin-cells, and the same or an analogous chemical change may, and probably does, cause the dentin in pulpless teeth and the enamel in erupted teeth to become harder in course of time. Many experienced dentists have clinically observed that enamel of young teeth becomes harder in course of years. Many experienced dentists have observed symptoms of sensation in the dentinal fibrils of pulpless teeth that would indicate that those fibrils received nourishment through channels already existing independent of the pulp. If new channels had to be constructed Dr. Williams's cell objections might have weight, but, as the avenues of nutrition for pulpless dentin exist before the pulp is destroyed, it is difficult to see how the accepted doctrines of cell development, growth, or nutrition are in any way antagonized.

The nutrition of the body is attained through a combination of chemical and vital forces. That the purely chemical enters in the process of nutrition as much as cell development, or cell growth, or any kindred phenomena, is illustrated by the change of oxyhemaglobin to hemaglobin and back again.

Thus the issue is before us. Dr. Williams, as I understand, denies that pulpless dentin can become harder in course of years. Will he explain why it is impossible for erupted enamel and pulpless dentin to become harder through chemical action, either within the molecule itself or from slight additions received from the blood-plasma?

There are two avenues from which the dentinal fibrils obtain nourishment,—the cementum through interglobular spaces, and the pulp. Dr. Williams affirms that when the pulp is destroyed nourishment can no longer enter the dentinal fibrils through interglobular spaces. Will he explain why the extirpation of the pulp should prevent nourishment from going to the dentinal fibrils through the interglobular spaces?

JOSEPH HEAD.

HIGH-FUSING PORCELAINS.

To the Editor of the Dental Cosmos:

Sir,—In the October number of the *Items of Interest* a change was made that may deceive the profession. It is in the report of my paper on high-fusing porcelains, read at the last meeting of the New Jersey State Dental Society, and is to be found on page 724, tenth, eleventh, and twelfth lines from the bottom, where I am quoted as saying, "The high-fusing porcelains made for inlay work by the Consolidated Dental Manufacturing Company are in my opinion the best porcelains ever offered to the profession."

What I said was, "The high-fusing porcelains made by Mr. Whitely are in my opinion the best porcelains ever offered to the profession." I did not mention the Consolidated Company because I knew Mr. Whitely was no longer with them, and justly feared, as events have proved, that the material, lacking his personal supervision, might henceforth not be so good.

The editor of the *Items of Interest* excuses his action by explaining that he made the change because he did not wish to advertise an employe who had left the company he represents. Such advertising zeal ordinarily does not interest professional men, but when this zeal perverts the accuracy of scientific papers it becomes dangerous.

The porcelain inlay material now made by the Consolidated Dental Manufacturing Company is no longer indorsed by me since Mr. Whitely left the company.

I am compelled to ask space from the Dental Cosmos, as the editor of the *Items of Interest* is unwilling to rectify the error.

Joseph Head.

Philadelphia, October 25, 1899.

PROCEEDINGS OF SOCIETIES.

AMERICAN DENTAL SOCIETY OF EUROPE.

The twenty-sixth annual meeting of the American Dental Society of Europe was held at the Institute Ravenstein, Brussels, Belgium, beginning on Monday, August 7, 1899. There was a good attendance of members and visitors.

After the transaction of routine business the president, Dr. L. A. O'Brian, of Dresden, delivered the annual address, as follows:

Gentlemen of the American Dental Society of Europe: On glancing over the program arranged for this meeting, I see it is rich in scientific professional subjects from pens wielded by most able hands.

During the last few years the question of dental politics has demanded so much thought and consideration on the part of the members of this society that, with your permission, I shall confine myself to this one subject.

A quarter of a century ago our society was founded on the Righi by the pioneers of American dentistry in Europe. They were gentlemen of education and high professional abilities, who by conscientious scientific treatment not only won the love and respect of their patients, but established in foreign lands an enviable reputation for themselves and their profession.

At that time these pioneers were engaged in slowly but surely educating their patients, and by so doing they demonstrated to Europe the great necessity for and the benefits of proper dental treatment in combating and conquering disease, and they established the prestige of American dentistry in Europe.

From these comparatively early times until within a few years ago the doors of all Europe were open to any American dentist who would come and undertake this missionary work, but not every man was willing to leave his home, family, and friends to take up his abode in a strange land, with customs and traditions to which he was entirely unaccustomed. The few, however, who did venture were men of intelligence and education, and in due course of time well-earned honors recompensed them for their honest and arduous efforts.

Our roll-call shows that many of these gentlemen are still active and honored members of our society. The remaining names represent posterity which has fallen heir to the structure whose foundation was so solidly and thoroughly laid. Every name on the list represents an earnest worker, who ever has and ever will strive to maintain the high standard which has been established, thereby maintaining the reputation of our profession abroad. Many of the names are those of gentlemen not American born, but of Europeans, who, realizing the benefits of our college education, have gone to America and honestly earned the title which we honor, and which entitles them to be respected and received by us as brother colleagues. But, in spite of all this, a gradual change has been taking place, and to-day the doors of all Europe are closed to the American dentists who in future may desire to practice here, unless they hold a degree from the native universities.

That the degree of D.D.S. commands respect is demonstrated forcibly in one way by the fact that so many of our European cousins go to America to obtain it, and also that every charlatan has on some kind of a sign the words "American dentist" in large type.

The question arises, What has caused this sudden shutting of doors against us? Is it because nearly every other house in certain sections of the large cities is decorated with large parti-colored signs and the ominous words "American dentist," detracting greatly from the beauty of the surroundings? I once asked a gentleman whom I knew had no possible right to call himself an American dentist why he did so, and his reply was, "Because I practice on American principles." Of course, our America and her universities have no possible jurisdiction over a case of this kind, but there are other cases over which she does have jurisdiction; and these are the cases of so-called American dentists who have never seen America, and who yet hold diplomas as perfect as yours or mine.

Our German friend, Dr. Erich Richter, of Berlin, has shown a list containing an appalling number of names of practicing American dentists, some of whom have obtained American diplomas *in* *absentia;* others who have gone to America and returned after an absence of six weeks with a dental education, as their diploma shows; and many of these men cannot to-day, or, for that matter, never could, speak a word of English.

A still more condemnable kind of impostor is to be found, and that is the American charlatan, who, with commercial instead of professional ambitions, has established so-called dental parlors and advertises his wares and his abilities in many ways. One of these establishments in particular impressed itself upon my mind. This dentist had secured a large show window in which he exhibited a large tray filled with second-hand vulcanite plates, on the top of which was a placard with the words, "Your choice from one to five shillings." This man called himself an American dentist, but I must say it was a new phase which surprised me.

Do you imagine, gentlemen, that this condition is only to be found in Europe? If so, here is a story told me by a patient, a German nobleman on the government staff of His Majesty the German emperor. This gentleman was passing through the streets of one of our largest cities, and saw a large gathering before a show window of one of the so-called department stores. His curiosity was aroused, and he joined the throng to witness the following spectacle: The whole window had been fitted up to represent a dentist's operating room, and there, in the chair, was seated a patient undergoing operations at the hands of an American dentist for the edification of the gaping crowd and the aggrandizement of the department store.

Gentlemen, honest dentists worked hard for many years to establish a standard of education which should cause graduated dentists to be considered as members of the medical profession practicing a specialty of medicine. Here are two anecdotes from two physicians in America who did me the honor to call upon me in Dresden. The first one was a prominent physician from Providence, R. I., who, after looking about my operating room a while, remarked that, "judging from the number of signs he saw, he had come to the conclusion that dentistry must be getting to be a very popular trade." The second is from a physician prominent in Detroit. While awaiting in the salon at my house he picked up a copy of the DENTAL COSMOS and looked it through. His remark to me later was that he had no idea so much could be written about dentistry.

Enough of this, gentlemen; in my opinion Europe is justified in the steps she has taken, and the only way to again open the doors is to put down the corrupt state of affairs in our American institutions and make all standards alike.

In the city of Chicago I am told there are over thirty institutions teaching dentistry, and each one of these institutions holds a charter from the state of Illinois. The laws of this state set forth that any three men applying for a charter to open an institution of learning may obtain the same on the payment of a fee of twenty-five dollars, which is the only qualification demanded. The degrees granted by some of these institutions do not allow the graduate to practice his profession even in the city where he was graduated unless he again subject himself to an examination from a so-called state board of examiners, who have it in their power to pluck a man if they think he could later on affect their personal interests. To see how much faith the dental profession places in its colleges and boards of examiners, one only has to read the July number of *Items of Interest.*

The more I write on this topic the more endless and inexhaustible it seems to grow, and my difficulty now is to know where to stop; but a few words more will bring me to a stopping place.

Partly, if not largely, through the efforts of this society the National Association of Dental Faculties has been established, and holds its meeting this year in Niagara Falls. Our indefatigable Bryan is there, with other delegates, to express to the National Association of Dental Faculties the disapproval with which the American Dental Society of Europe regards the existing state of affairs in America, and to co-operate with them in bringing about the much-needed reforms.

It seems to me that instead of giving the students two separate examinations before allowing them to practice, it would be better to establish a national government board, who should carefully examine into the credentials and qualifications of the people who apply for charters to teach; and if the standard was made as high as many of the countries of Europe have now made theirs, but very few of our institutions would be able to keep their doors open. This is a topic for individual thought, and I hope it will be the aim of this society to give its support not only by inducing, but, if necessary, by enforcing reforms which shall make it impossible for any man to practice under false colors.

On motion of Dr. SPAULDING, the thanks of the society were extended to the president for his able and interesting address.

Dr. A. WETZEL, Paris, read the following paper:

SOLILA GOLD AND ITS ADVANTAGES IN FILLING TEETH.

Since the introduction of crystal gold, about sixty years ago, many such preparations, often called "sponge gold," have been brought to the market; but very few of them have been able to hold their ground for any length of time. It is very likely that several preparations worthy of a place in any good dental office have not come to my notice on account of not having been sufficiently recommended to me, or my not having been able to obtain them at the dental depots.

For many years I have been using with great satisfaction a crystal gold prepared by A. T. Watts, of New York, and for certain fillings, especially small ones, I give it still the preference. But since the introduction of the so-called Solila, which has been invented by the late and much regretted Dr. E. de Trey, of Vevay, I have been using that crystal gold almost altogether; sometimes alone, or often in combination with other filling-materials. I believe that most of you gentlemen have used it and given it a thorough trial, and I also know that many of you have ceased using it on account of not obtaining the desired result. From the very moment that I thought of speaking about Solila before such an intelligent body of men I knew that I should meet many of you that were not in favor of this crystal gold, but the good results I have myself obtained from it in my practice have induced me to continue to do so, notwithstanding this, and to explain to you my way of manipulating this material.

When the Solila was introduced to the profession its use was not sufficiently demonstrated by its inventor, who was an experienced and most careful operator; but it was done by some dentists who had only a very vague idea of gold fillings. They packed the gold into the cavities almost as if it had been amalgam, and filled up the hole with a piece of Solila that was almost as large as the cavity itself. In such cases the gold is condensed only at the top, and is left porous at the bottom. I had myself some ill success with it in the beginning, but was not long in finding out that hand-pressure alone, especially with large instruments, was not sufficient to condense it. Whenever I use hand-pressure I line my cavities with Abbey's soft foil or Herbst cylinders, which are very soft when not annealed, or with gold and tin. Then I poke De Trey's gold in the center, and with hand-pressure I work it against the walls and into the undercuts.

I have filled well-polished cavities made in blocks of steel, taken the fillings out, and found they were quite polished on their surface. Solila alone, pressed into those steel blocks with hand-pressure only, came out with a mat surface, but when the Solila is hammered into the steel blocks it has a beautiful polish, which shows how perfect a fit it was. Therefore whenever I can use the mallet for any kind of gold fillings I always do so, and then I am sure of a perfect fit and a good polish when finished, which cannot be affected by any mastication.

I pay particular attention, when the filling reaches the end of the cavity, to cover it with foil, No. 4, 20, or 40, Williams's standard gold. I do this so as to get a better edge strength, or finish near the edge of the cavity. Very often I also finish with Solila, and get a very hard surface when the gold has been well annealed and introduced with the mallet. I only use Solila No. 3, and cut it into strips just as I do with gold foil. For very small cavities I generally use other gold, as the Solila has the disadvantage of crumbling in working; but I think that for large cavities (contour fillings) there is no other gold with which we can fill up so rapidly and make so perfect a filling in the same space of time. This is of great consideration in operative dentistry, as it removes a great strain from the patient as well as from the operator, especially as we have no other material at the present day that will be as lasting as a *good* gold filling in its *proper place.*

In filling a very large *simple* cavity with weak walls I often proceed as follows: After the cavity is well prepared I fill it up two-thirds with Harvard cement, and as soon as the cement commences to harden press onto it a heavy layer of Solila that covers almost the entire surface of the cement, at the same time being careful that the cement does not quite reach or cover the edge of the cavity. In this way I get an excellent start for the filling, and do not require any undercuts. If possible I press small pieces of soft gold, or gold and tin, on the walls or edge of the cavities, and then build up the rest with Solila, which packs in almost no time. Solila renders me the greatest service in my practice, and has reduced my daily labor to a considerable extent; and therefore I can advise you to give it a thorough trial, and believe that in a short time you will find it most useful.

Gentlemen, if I have not brought anything new before you, I hope my paper will be the cause of a discussion which will bring more light on the subject, and be more instructive and interesting.

Discussion.

Dr. Eug. Wetzel. I am quite of the opinion that this gold does require thorough condensation. In certain cases I use the mallet such as was introduced many years ago by Dr. Elliott, of London, but for ordinary purposes I use the automatic. In order to get a uniform density of the surface, I prefer to finish with Williams's foil, No. 40 or 60.

Dr. G. W. Field. I think that Dr. Wetzel mentions its weak point when he says Solila takes more time for manipulation. This is also true of crystal gold. It is much more satisfactory to use soft gold as a foundation, but at the same time to get a surface which is smooth and perfectly uniform I prefer to rely upon foil.

Dr. G. C. Daboll. I have read a paper upon the use of Solila gold written by the late Dr. de Trey, and have also seen some of his fillings, but I doubt if those fillings were made by the method he has published in the dental journals. I have filled a number of cavities both inside and outside of the mouth, and where I have been able to get the requisite amount of force for condensation have found the results fairly satisfactory.

I wish to confirm what Dr. Field has said, that this gold, like crystal gold, requires a greater amount of time for its insertion.

Dr. A. Wetzel. I never allow it to come to the surface. There is no object in it, and I prefer to depend upon foil. I use this or soft gold for starting fillings, and think there is nothing superior. This gold requires the same amount of care and attention in condensation that we bestow upon any form of foil.

If there is any object to be gained in using it, it is where we line cavities with cement of a quick-setting variety, inserting a piece of Solila well into the surface before it becomes hard; after which we can proceed with the filling in the usual way.

The subject was then passed, and the following paper was read by Dr. Eug. J. Wetzel, of Muhlhausen:

Hygiene of the Mouth.

Science shows us that the mouth is an almost perfect incubator for the development of micro-organisms of every kind. The care which should be given the mouth, the value of which is generally disregarded, is neglected by the greater part of the population, and many of the most intelligent people pay scant, if any, heed to it. Such an indifference is to be regretted, especially as the hygiene of the mouth, from the standpoint of general health, is so necessary to the preservation of the teeth, and thus worthy of the highest interest.

The mouth is one of the most important organs of our economy. It is a laboratory where the mastication of aliments is carried on; it is a vestibule which commands the entrance of both the respiratory organs and the alimentary canal, the good or defective working of which it reflects. It is, further, a sort of fermenting vessel, where the germs so abundant in the air which we breathe penetrate, and under the most favorable conditions are there developed. Harmless or noxious, these germs fructify equally. Thus we are able to explain how the micro-organisms of contagious diseases, after having developed themselves in the mouth, where they have been brought by the air, penetrate into the system by means of the bronchial tubes, the alimentary canal, or even by the buccal mucous membranes, when these are ulcerated.

The destructive effects of certain microbes fostered by the absence of hygienic care bear more particularly on the teeth. The alimentary particles left in the interstices by careless people are frequent causes of caries. The contact of the saliva and the microbes which it contains with these particles gives birth to organic acids. The latter first alter, then decalcify the enamel; and the lesion, becoming little by little aggravated, opens the way to the parasites productive of caries. If no fermentable substances were left in contact with the teeth, caries could not possibly be produced.

The consequences of destruction of the teeth, the cause of a most painful affection and notable inconveniences, are laborious digestion of aliments imperfectly divided and insufficiently penetrated by the saliva, dyspepsia, disturbances of nutrition, and general debility of health. It depends on us to avoid such discomforts, to a certain extent at least. Some exceptions must be made, however, in cases of individual predisposition, and those of persons who oppose less resistance to disease.

It is sufficient, therefore, to take the following care, often neglected, however, which we are going to bring under notice:

1. The washing of the mouth and brushing of the teeth in the morning and in the evening, the rinsing, if possible, after every meal.

2. The examination of the teeth by a dentist twice or thrice a year. The washing of the mouth with aromatic water, or water with some antiseptic substance, is very useful, but it should be accompanied by cleaning of the teeth with a tooth-brush the bristles of which must be flexible, but not too soft, impregnated with some tooth-powder. A thorough brushing rids the teeth of the substances which would otherwise stick to the necks of the tooth and favor the formation of tartar.

Many people believe they have taken sufficient care when they have completed their morning toilet with this operation; but if the cleansing in the morning is useful, that in the evening is much more so, because during the night the saliva is not produced so abundantly as in the daytime; it does not sweep the mouth and rid it of alimentary residues; fermentation is frequent, and its actions more prolonged. It is therefore particularly necessary to wash the mouth every night in order to rid it of fermentable substances.

It would be desirable to rinse the mouth after every meal. Unfortunately we are obliged to take into consideration the material difficulties such customs encounter in the carrying out. We should not be afraid to use toothpicks, which, especially when flexible (quills), are far from having all the inconveniences attributed to them.

The periodical examination of the mouth is an excellent measure now adopted by a certain number of persons, but most people, before soliciting the advice of their dentist, wait until they are warned by sufferings and the undesirable presence of the disease. It is almost always too late, the long unsuspected caries having already reached the deepest and most truly sensitive parts of the teeth, and the vitality of the organ being already endangered. The case would have been quite different if the dentist had been able to detect the first manifestations of the disease and arrest it by means of an operation so much simpler when practiced at an early period.

To allow the dentist to exercise such a preservative action it is necessary to submit to his frequent examination. Formerly such visits were not unprovocative of a certain apprehension, easily understandable, inasmuch as extraction was the only mode of treatment. Nowadays this is no longer the case, when the art of dentistry, benefiting, as all other branches of surgery, from Pasteur's discoveries and the antiseptic method, has made such important progress.

Dentists now possess the necessary means to insure in most cases the preservation of the teeth, but they can only obtain this result by means of regular inspection.

If the care to be given the mouth is necessary to grown-up persons, it is quite impossible for children to dispense with it. If, at every period of life, nutrition is of the highest importance, it must be admitted that with children this function is paramount. A minimum of food will satisfy the adult; what he needs is a quantity of aliment which will exactly suffice to restore the vital spark; in fact, he has no longer to preoccupy himself with his growth, for after his twenty-fifth year he ceases to grow; but such is not the case with a child, who has to reckon with his growth, and not only keep what he has acquired, but meet the next bills which are coming to maturity. If the teeth do not properly perform their part the stomach gets tired; there is insufficient nutrition, and the child's life is in danger.

On the other side, we are not all born with the same aptitude for life; some children come into this world under very unfavorable conditions; one chance only to escape the dangers which threaten their young lives is left them, a struggle for life by means of an intensified nutrition. Should the energy of their nutritive functions be in some way or other diminished, all the complications by which they were first threatened arise so much the more easily that the ground has been the better prepared by an insufficient nutrition. Therefore the parents must have a due sense of their responsibility as regards their children, and know that in the first years of their lives the part played by dentition is a preponderate one. The dentition must be closely watched at this very period, for it is on it that the defects of heredity, the general state of health, and acute affections recoil.

Besides the habitual lesions of children's teeth, there are other peculiarities placed under the dependency of either accidental or hereditary disturbances of the nervous system, or perturbations in the evolution, which, submitted at the beginning to particular care, may be more or less completely stopped or neutralized. I speak of an arrested progress of development, a defect in the conformation and defective directions which may affect the dental apparatus. The limit of curability for such malformations, the consequences of which are sometimes so serious, not only from the standpoint of mastication, but also from that of the symmetry of the face, does not extend beyond thirteen to fourteen years. It is evident that the nearer we come to the time of their apparition, the better we can oppose their development.

In order to give an adequate notion of the frequency of dental alterations with children, the number of children, according to Dr. Dally, who are in urgent need of dental care is at least eighty-five per cent. (*Bulletin de la Société de Médecine publique*, 1893.)

Thus children and adolescents are not less exposed than adults to dental affections, but it has been observed that under the influence of cerebral work those affections increase with them in notable proportions. In France a great light has been thrown upon this fact by MM. Lucas, Championnière, Crétien, Galippe, Magitot; and the same statements have been made from abroad by Drs. Sitherwood and Harlan. Dr. Sitherwood has noticed that the sound teeth of students given to hard work alter rapidly some months after their admission to school, and that nothing stops the progress of the disease except the interruption of the studies. It is perhaps a consequence of a too rapid consumption by the brain of the phosphated aliment destined for the teeth, or may be because the general health suffers from the excess of work. Dr. Harlan affirms that premature labor is injurious to the development of the teeth. Caries is frequent with schoolboys whose progress is remarkable, and the eruption of the permanent teeth is often premature and their quality bad in children sent to school when very little.

Drs. Marten and Magitot, who during a number of years attended the pupils of the Ecole Polytechnique (Polytechnic School), the former as a physician, the latter as a dentist of said establishment, where intensive labor is habitual, had frequent opportunities to ascertain the accuracy of their observations, which therefore rest on experience.

The reasons I have just given show superabundantly the necessity that care should be given to the mouths of children and adolescents.

Discussion.

The PRESIDENT. Our thanks are due to Dr. Wetzel for his able paper. Our patients often overlook the fact that the teeth must be carefully attended to, and with all the teaching in the world will continue to do so; but if such facts can be brought home to them it would be sowing good seed.

Dr. ROSENTHAL. When I first came to Brussels I learned that they did not have children's teeth attended to. They said, "Well, we cannot afford it. We can afford to have ours attended to, but not the children's." I thought the matter was rather serious, and in my practice I have established a method for the care of the children's teeth, and made it so cheap that there is no excuse for the neglect of the children. The younger the child the less he should pay. I do not take any more children after fourteen years of age, and the parents send me the children four times a year. Every three months I see all the children of my practice, and I have now about one hundred and fifty children passing through my hands. This is what I have to say in regard to the paper.

Dr. CUNNINGHAM. I have investigated Dr. Rosenthal's method, and deem it worthy of further explanation. Parents can afford to pay twenty francs a year for children of four years of age, and up to twenty they still pay twenty francs. Between the ages of six and nine they require more care, and thus the charge should be, from nine to twelve years forty francs; from twelve to fourteen years fifty francs. This is very cheap, and is an inducement to the parents of the children attended. It is *very* cheap if you consider the matter. Taking an average, however, you are well paid for the work you are doing. There are many cavities you have to attend to the first year, and it might result in a loss to you; but if you take the average, from four to twenty years, you will see that you are well remunerated for what you have been doing. You must not consider this as regards one or two patients, but what it brings in as a whole; and having the children's teeth to attend to entails the care of the parents' also.

The PRESIDENT. One point which I have always held to occurs to me. Conscientious treatment of children's teeth in early years is one of the greatest preventives of such irregularities as you would have to contend with later on. I consider that Dr. Rosenthal is doing very good missionary work, and do not think he is overpaid for it.

Dr. CUNNINGHAM. I presume that the immediate purport of the paper this morning is that we shall be provided with a wash for washing out our mouths. I remember an intelligent surgeon instructed in dentistry being at my house. He said, "You are a fraud. You tell me that I should rinse out my mouth, and I ask you in my capacity as patient, Why don't you give us some of your mouthwash after dinner?" It is absurd. I admitted as much to the patient. I prefer to see a mouth washed out after a meal rather than the picking of teeth, and I must point out that if we advise patients to do certain things we, too, have a mouth for hygienic treatment, and we ought to set the example.

With regard to one point, I should like to propose having a little pamphlet on the care of the teeth, and I should very much like the society to do something in connection with this matter. I think it would be a very good thing if we could have a hand-book. I think if we take it on common grounds we should do a great deal.

The PRESIDENT. How advantageous it would be if we could direct our patients, particularly in the treatment of their children's teeth. Sometimes we do not have time to talk to them; again, we do not see their children, and it does not occur to us. A pamphlet giving them the "why and the wherefore" of treatment would be a possible thing, but to my mind printing such a booklet would look like an advertisement. At least, if one man published such a thing it would look like advertisement, but if a society could approve of such a work and let it be compiled, and issued by the society, it would, on the contrary, be another great missionary undertaking.

Dr. FIELD. Only a few words to say I think we all agree with the points aimed at, and that we ourselves live up to the paper we have just listened to; but I think as professional men we are to blame for the whole condition of affairs. I will illustrate that with one remark made to me by a prominent medical man in London. He was urged for two years to make me a visit. He walked in and said, "Doctor, I suppose you cannot do much for me, but here I am." I gave him some treatment, and I lectured him as a patient, and asked him if he knew the state of his mouth, the amount of disease there. After three or four visits he came in and said, "Dr. Field, why haven't we known this before?" I say it is our fault. We look too much for the pounds, shillings, and pence, and as a profession we are known more as mechanics than professional men; and if we would only lecture on the state of the mouth we would do more for the raising of the profession.

What we have in view is the health of the mouth. I want to insist upon that one word "health" of the mouth, not simply the cleansing of the teeth or the washing of the mouth. Patients come in with no idea as to the health of the mouth; they only know that the teeth require treatment.

Dr. G. C. DABOLL, Paris, read the following paper:

SIMPLICITY IN THE TREATMENT OF PULPLESS TEETH.

A hackneyed subject, yet "pulpless teeth" are probably responsible, in the first fifteen years of his experience, for half the anxieties and worries which beset the dentist.

As in the case of many other operations which must be encountered daily, a number of our colleagues seem never able to comprehend and master the details of the various stages that lead to a successful result. The entire operation is one of hesitation; uncertainty attends every step,—at one time the result of improper manipulation, at another the lack of conviction as to methods, remedies, and prognosis, and by which an operation is beset with complications, and often ends in failure.

The object of this paper will be to indicate the method of the writer, a method born of experience and observation extending over many years, and which, if followed carefully through its successive steps, will, he does not hesitate in affirming, yield the maximum percentage of success.

The first move in the scheme, and that on which the result of the successive steps largely depends, is absolute isolation of the tooth or root from the oral fluids; preferably by application of the rubber-dam, as being the most reliable means. There will be cases where the dam cannot be used; then other means must be resorted to; but the making and keeping the tooth dry during the treatment is absolutely imperative. The dam should be applied before any work, whatever its nature, is performed. The opening up of the pulp-chamber—enlargement of the mouths of the pulp-canals—will be the more easily and more surely accomplished if the tooth is isolated.

Now, the dam *in situ* opens the tooth in a manner that allows as direct and free access to the pulp-canals as possible. This is especially important as regards the molars, it being sometimes extremely difficult to get access to the anterior roots; and where the exposure of the pulp has come from the distal aspect of the tooth, it will be found wiser and more economical of tooth-substance to fill the cavity and open into the pulp-chamber from the mesio-coronal surface. With the six anterior teeth, unless the caries is very extensive, it is often advisable to open the pulp-chamber from the labial surface; this may be more trouble in the beginning, but it will save time in the end. In the molars and bicuspids, enlarge the mouth of the pulp-canals with the Glidden drill; this done, proceed to remove whatever contents of the chamber and canals you can find. One cannot be too minute. And, following this, wash thoroughly with hydrogen dioxid, pumping the same into the canals until there is an entire absence of bubbles, indicating antisepsis. This point reached, dry out the pulp-chamber with spunk or bibulous cotton, and the root-canals with stiffened paper-points or hot air. Carry into the canals as far as possible a fine twist of cotton moistened with oil of cinnamon. Seal the cavity with cotton and sandarac, and dismiss the patient for three days; at the end of which time change the dressing, never omitting to apply the dam; seal the cavity with red gutta-percha, and, if it will admit of it, leave it for eight days, when, if no complications arise, the permanent final operation may be performed. Time is an important factor in many cases, especially those that have become chronic; but in the average case almost any tooth may be filled after three dressings.

Where living pulps are extirpated the operation is, of course, finished at one sitting, as is also the case with those having fistulous openings. In blind abscesses it may be necessary, when there is a discharge of pus, to make one or two dressings of formalin, always taking care that it does not come in contact with the soft tissues. Then, as soon as the discharge ceases, one or two dressings of oil of cinnamon will suffice.

Thus we have,—

First. Isolation from beginning to end.

Second. Free and direct access to the pulp-canals.

Third. Thorough desiccation of the pulp-canals.

Fourth. Neutralization of all septic conditions.

Fifth. And last, but not least, time sufficient and most careful attention to all the details.

These foregoing points, carefully observed, will insure a successful result in ninety-five per cent. of cases, making a simple system of treatment which in the large majority of cases presented may be relied upon by the inexperienced.

A last counsel for what will be a remote contingency. Never allow a patient to depart when the root is finally filled, without ample directions as to the use of ice in case pericementitis supervenes. A lump of ice as large as one's fist, and wrapped in a napkin, should be held firmly against the face, directly over the tooth affected. When applied at the beginning of the trouble, it never fails to reduce the congestion.

Discussion.

The PRESIDENT. It is quite a relief to hear that some men do not go on treating a tooth for two or three months, and sometimes even six months. There is one thing which I do a little differently from Dr. Daboll. He applies a piece of ice to the outside of the face. I put a piece as large as a walnut into the mouth. It comes certainly nearer to the seat of inflammation. If it were a diffused inflammation, perhaps the external application of ice would be more desirable.

Dr. DABOLL. In regard to the application of ice in cases of congestion, the only way, and the rational way, to reduce that congestion is to reduce the capillaries and drive the blood from the part. I have tried ice placed directly in the mouth, but the cold coming against the other teeth is very disagreeable. I have never known this treatment to fail, even in the most desperate cases. It should always be applied at the beginning of the trouble. To show you what can be done, I had filled a lower third molar, and you know how difficult it is to get to the apex of the root; it was a very difficult case. I treated it carefully and filled the tooth, giving the patient instructions. She applied the ice for thirty hours. She did not come to me for two days, and then thought she must have the tooth out. I put her in my chair, sent out and got a lump of ice, and sat there for two hours, until she got some relief from the pain. I sent her home, and told her not to take the ice off her face for twenty-four hours. I saw her again at five o'clock in the afternoon, when the tooth had returned to its normal condition.

It is necessary to show the patient how to apply the ice. One must be very careful to do this. It must be pressed against the face, and the larger the piece the better the effect. Another case I have in mind. A person for whom I had operated returned the next day and said he would have the tooth out. It was a molar, and I objected to removing it. I put him into the chair and sent out for a lump of ice, and in three hours the trouble was gone. I have never known it to fail. Ice will not fail when properly applied.

Dr. CUNNINGHAM. I should like to say a few words on this question. I use ice; I use also hot water. I have had some phenomenal results, but some time ago I had a very peculiar case. It serves to illustrate treatment of this kind. A patient came to me, and I treated the right and left lateral incisors. I dismissed the patient, and he went away in the morning about 12.45. He came back to the house at 2.30, and was not recognizable. I did not believe it possible that such a change could take place in so short a time. I put him on the ice and hot water treatment, and in the course of two hours he was certainly fairly presentable. The eye had come down to its normal position. He went away much easier. I saw him again a little later and told him to arrange for a visit, but he said it was not necessary, as he was comfortable. That is a most extreme case; so that I evidently indorse what Dr. Daboll has said.

I take up another matter. At one time I used to talk in exactly the same way with regard to the use of the rubber-dam, but I certainly have proved to myself that the necessity of the rubber-dam is not of so great consequence as it appears to many. At the same time, it is an error on the safe side. The student should be master of the rubber-dam, and should use it. Dr. Daboll has done well to enforce this upon you.

Dr. DABOLL. I have never known ice to fail, and up to this date have not had occasion to use hot water.

The PRESIDENT. I think we three gentlemen agree in regard to the use of ice. I speak of ice in small pieces, because it has been my good fortune to attend the patient when the trouble was in its infancy; it does not touch the teeth; I break the ice in long pieces and place it upon the gum, at the same time protecting the teeth.

Dr. ERNEST SJÖBERG, Stockholm, Sweden, read the following paper:

A FEW WORDS CONCERNING THE LATEST DENTAL LAW (1896) AS TO THE MANUFACTURE OF PHOSPHORUS MATCHES IN SWEDEN, AND ITS WORKING.

Among the most interesting subjects at the last meeting of the American Dental Society of Europe was certainly Dr. Cunningham's excellent paper upon the means of combating phosphor-necrosis. It was interesting not only as a paper touching a subject of the utmost importance to us, but highly interesting also from the fact that the doctor did not propose, as the best means of getting rid of the disease, to give up the manufacture of so-called phosphor matches; but to continue the manufacture, at the same time attaching experienced dentists to the factories in order to provide the workers with as good treatment as the present high standard of dentistry is capable of affording. The doctor proposed thus to battle against and to conquer phosphor-necrosis; first of all prophylactically.

Taking exception to the doctor's views, I felt it a duty to emphatically protest against the advisability of the proposition. In view of the importance of the question, I have thought well, after having studied it more in detail, to take the matter up again, and I hope it will be of some interest to you to hear something as to how the question is looked upon in Sweden.

The latest law regarding the manufacture of matches in Sweden dates from 1896. I will now give you a summary of it, and, as it would take too long to give the translation *in extenso,* I will confine myself to the principal points contained therein.

The law of December 30, 1896, concerning the manufacture of matches, which was made with a view to prevent phosphor-necrosis of the jaw among workers in match factories, states (Art. I-VII):

The manufacture of phosphor matches is not allowed save in factories especially erected for that purpose.

No one is allowed to erect such a factory unless he can show by certificate that he has sufficient knowledge regarding the materials used in such manufacture, or unless his manager is able to show such certificate.

The factory must be situated on an open and dry spot.

The factory must contain the following special rooms: First, a room or rooms for the preparation of the igniting substance and for the dipping of the matches; second, a room or rooms for the drying of the matches; third, a room or rooms for packing the matches in bundles or boxes. These rooms must be well ventilated.

Further, special rooms, well ventilated and lighted, must be provided,—*i.e.,* first, a room in which to keep wearing apparel used in the factory, which should be supplied by the proprietor; second, a room where the workers can take their meals and leave their ordinary clothes and their food; third, a room with adequate appliances, where the workers can wash themselves and rinse their mouths after having finished work.

No one under eighteen years of age is allowed to perform the work of preparing the igniting substance, or dipping the matches, nor is any one under fourteen years of age to begin the work of drying or packing them.

No one shall be received as a worker before having been examined by the physician of the factory and found able to take part in the work without bad results to his health.

A workman who has had a dental or other operation performed may not again begin work without the consent of the examining physician. (Please note "physician"; not a word about the dentist!)

No one is to be allowed to work on the preparation of the igniting substance or the dipping of the matches for a longer time than one month, nor to resume work before the end of another month; and not even then if there are signs that his health has suffered from the work.

The working dress must perfectly cover the clothes beneath. At conclusion of work the dress and shoes must be kept in the special room.

In the rooms where the preparation of the igniting substance and the dipping of the matches goes on the workers are not allowed to remain longer than is necessary for the execution of said work, nor may the workman take any food into the room in question.

Article VIII gives several instructions as to cleanliness of the rooms.

Article XI. "A physician, paid by the director of the factory and nominated by the government inspector, shall be attached to each factory. At least once in every three months the physician shall make a thorough examination of all the employes. The owner of the factory must specially see that workers suffering from diseased teeth and gums are immediately put under the care of the physician."

A penalty of from ten shillings to thirty pounds is imposed in case of neglect in observance of this law. Failing to pay the penalty, the proprietor is liable to imprisonment.

These, then, are the principal points of the law. Has experience shown us that much good has been derived from it? The answer must be "yes." Is the law sufficient? By no means. But now there is considerable amelioration since the nomination of factory inspectors (Yrkesinspektörer). These were first nominated at the end of 1889, and the latest law is the outcome of their experience. It is true a law, that of 1870, regarding this question already existed, but the manufacture of matches at that period, before the nomination of inspectors, offers a good example of the inefficiency of a law the application of which is not specially enforced.

Since the nomination of factory inspectors circumstances have unquestionably improved, but there is still very much to be desired. To begin with, there are too few inspectors. With the best will in the world, they are unable to sufficiently control the factories in their districts, which are, moreover, much too large; and in order to counteract the poisonous effect of the phosphorus the workers must themselves attend to keeping their mouths in a healthy condition, which they do not often do. In a report made some years ago the inspectors state that the workers are not very fond of measures taken for the protection of their health, unless it be in the case of such as have brought about improvement in the very bad ventilation in some factories, or the removal of other such palpable inconveniences. They often find such measures an annoyance, a hindrance, and such as to impede them in their work. One of the principal aims of the law of 1896 was to create an efficient control of the workers, in order to discover in time any incipient disease. But, as you have heard, the law only prescribes an examination every three months, thus allowing the lapse of precious time, much too long a period, as far as the mouth is concerned, at least, and in which irreparable ills may occur.

And how is this examination carried on? We all know how carefully an examination must be made in order to insure that nothing be overlooked, and how long a time it may take even an experienced dentist; whereas in these cases the examiner is a physician, who certainly very often does not even use a mirror. How easily are things overlooked in such an examination, and how important it is that dental troubles should be discovered early.

From a Swedish dentist, Dr. Gilck, who has had much to do with a big match factory, the "Phœnix," in Malmo, Sweden, I have received a rather drastic description of the manner in which such a quarterly examination was once carried on in his presence. The physician made a more than summary examination, really occupying less time than does the relation of it; then dismissed the patient. And when Dr. Gilck called the attention of the physician to several symptoms of incipient periodontitis the answer was, "Oh, I do not care for that. It is only when pus forms that there is occasion to do anything for the patient."

When it was unavoidable, the patients were sent to the dentist to have teeth extracted. For that operation and the following after-treatment a ridiculously small fee was paid, which sum was paid by the factory only after a great deal of trouble. To fill a tooth was not thought of for a moment. Of course, such circumstances have had a very depressing effect on persons who have devoted themselves to this line of work. Dr. Toll, a dentist in Vexio, Sweden, as well as Dr. Gilck, both probably the most experienced dentists in Sweden in the treatment of match laborers, have refused any further services to the factories, having become tired of the want of appreciation of their treatment on the part not only of the owners, but of the physicians as well.

In the Swedish Parliament, in the year 1892, there was a proposal to quite abandon the manufacture of such matches (as was done, for instance, about twenty years ago in Denmark). The proposition had no other consequence at that time than to cause a thorough examination of the question, from which examination it may be interesting to quote a few points. (It is well to remark that I am now only giving details from the southern part of Sweden, a vast territory belonging to *one* only of the inspectors.) In that territory the manufacture of phosphor matches during 1891 was carried on in ten different factories, the annual production amounting to two hundred and sixty millions of bundles and boxes. Of these millions, two hundred and twelve, or about eighty-one per cent., were exported, representing a value of about 1,353,000 crowns (nearly £75,000). During the year there had been among the ten hundred and seventy-five workers six cases of phosphor-necrosis, which shows that somewhat more than one-half per cent. of the workers had been attacked. The nature of the cases was still rather mild. In seven of the factories no case had occurred during the year. The number of workers in the three factories where necrosis had occurred amounted to four hundred and sixty-eight, which makes 1.3 per cent. diseased in those three factories.

Now, these figures do not seem to be very depressing. But it is well to remember that sometimes, from different grounds, cases of phosphor-necrosis may be otherwise designated, as, for instance, was exemplified in a case of phossy jaw which occurred in a southern town some time ago, when the patient was sent to the hospital for a surgical operation; and the case, which ended fatally, came under the heading of pyemia, and nothing else.

It has been claimed that in our days of good ventilation and general hygiene the cases of phosphor-necrosis are comparatively very few. But at the congress of the Deutsche Gesellschaft für Chirurgie, 1896, it was stated that the number of cases had increased. Riedel (Jena) had had twenty-four cases in eight years; Ziegler (Munich) was of the opinion that the number of cases had rather increased than diminished; and Bag (Danik-Biele), as well as several German authors, are earnestly desirous that the manufacture of poisonous matches should cease.

It is earnestly hoped by us that a new law making the appointment of dentists to the match factories obligatory, thus putting an end to the deplorable circumstances spoken of a few moments ago, will be enacted. Personally, I am convinced that the right thing to do is to give up the manufacture of the matches in question. My reasons are as follows:

To secure really good dental services at the factories would entail such great expense as to make the whole enterprise a very difficult one, to say the least. Though aware, from Dr. Cunningham's communication last year, that such a treatment has been tried with success in America, I believe that his beautiful and humane thought has very little chance of being carried out in Sweden, which is still producing immense quantities of matches. From an economical as well as from a hygienic standpoint, Dr. Cunningham's proposition appears to me far less practical than to give up the manufacture of yellow phosphorus matches altogether, for, in spite of the sacrifice of our best efforts and our heavy expenditure, we would still be uncertain of success; as it is not carious teeth alone, but also the alterations of the gum, which seem to predispose to phosphor-necrosis.

The reason given for continuing this manufacture is that a number of workers might otherwise lose their employment; but this does not seem a very good reason, as, of course, the manufacture of other kinds of matches would be increased, and consequently the demand for workers be maintained.

This was the way in which I looked at the matter at the meeting in London, and on my return home, after having studied the question more in detail, and heard the ideas of several colleagues who had much to do with match factories, I have found no reason to alter my opinion. We certainly must endeavor to have dentists appointed as soon as possible to our match factories, as well as to schools and other institutions, the army and the navy; but our best efforts should be directed to altogether abolishing the manufacture of poisonous matches as the only sure means of saving our working brethren from this terrible disease, phosphor-necrosis.

Clinics.

The Executive Committee had made most careful arrangements at the Clinique Libre de Bruxelles for the clinic, which was held on Wednesday, August 9.

Dr. Cunningham was, under very favorable conditions, able to give several demonstrations of his method of "immediate regulating."

Dr. O'Brian performed a most perfect operation with Dr. Jenkins's porcelain inlays. His extensive experience with this material enabled him to give many useful hints upon its use.

Dr. L. J. Mitchell demonstrated that most artistic results can, with ease, be obtained by "painting porcelain teeth."

Dr. A. Wetzel showed his method of inserting "Solila gold," as described in his paper.

Dr. Younger illustrated what can be done in the way of regulating teeth with "a little bit of string" (silk twist). In his hands the operation was very easy.

Others contributed their part, and the clinic was unanimously voted a great success.

Incidents of Practice.

Dr. L. A. O'Brian. I have had a number of cases in my practice similar to what is known as hoof and mouth disease among cattle, but where the infection came from I have never been able to determine. The course of the disease commences with inflammatory dark and dry condition of the mucous membrane, accompanied for about twelve hours with considerable fever, without much abatement for the next two days. On the third day there are marked ulcers on the cheek, the gums becoming greatly swollen. This lasts for about twenty-four hours. On the fourth and fifth days the gum, from the gingival margin down to the reflecture of the cheek, assumes a desiccated appearance. I have had three cases under my personal observation in Dresden, and another while practicing in Russia. In one case ice was prescribed by the family physician for allaying an inflamed condition of the mouth. Ice in Dresden being only procurable from the Great Central Meat Market, it was supposed that the infection might have been obtained from this source.

A treatment that I found efficacious was chlorid of potassium, but the most relief has been gained by a mouth-wash composed of equal parts of carbolic acid, tincture of iodin, and chlorid of potassium in dilute solution. This has a very soothing effect, and rapid recovery has been experienced under its use.

Dr. Spaulding related an experience which he had while in America last year. Hearing of the wonderful results obtained by the use of the electric current as a pain-obtundent during dental operations, he submitted himself as a patient, and though the cavity which was excavated on a former occasion had been excessively sensitive, with the aid of the electric current it was prepared without the least pain. He regretted that he was unable to get much reliable information in regard to how the operator applied this agent, and that the apparatus for its use was not upon the market.

Dr. Daboll had experimented, with quite a degree of success, with an apparatus which he had arranged for applying an electric current. They were both sanguine that before our next meeting this form of anesthesia will have been placed upon a scientific basis, and that the apparatus for its use will be obtainable.

Dr. Aguilar. I would like to say a few words about the use of cocain, which I consider very practical. I have not been able to obtain any success from the use of the solution in the ordinary way, even after an application of from thirty to forty minutes; but after applying the rubber-dam and making a fairly free exposure of the pulp I use the solution, exercising pressure upon it to force it into the pulp-chamber. I have used it in this way some thirty-five or forty times during the past few months, and the results have been most satisfactory.

UNION MEETING OF THE DISTRICT OF COLUMBIA DENTAL SOCIETY, MARYLAND STATE DENTAL ASSOCIATION, AND VIRGINIA STATE DENTAL ASSOCIATION.

(Concluded from page 1191.)

Third Day—*Morning Session.*

Convention was called to order at 9.30, and Dr. E. K. Wedelstaedt, of St. Paul, Minn., read the following paper:

A Few Words about Approximal Cavities in Bicuspids and Molars.

Mr. President and Gentlemen: As no subject was assigned, I have chosen the above.

Let us understand each other on the start, and then there will not be any chance of a misunderstanding. I shall confine myself to speaking briefly of approximal cavities in the above-named teeth. The patient will be at least twenty years of age, and in a good condition of health. There will be at all times an adjoining tooth in position. The filling-material will be of metal, gold or amalgam; either will answer. Permanent, and not temporary, fillings are alluded to.

It is generally acknowledged that all cavities of this kind should be cut broad enough linguo-buccally so that their margins, when the cavity is prepared, will pass all contact with the adjoining tooth. On this point few of us differ, but what we do differ on is the extent of cutting necessary from the grinding-surface toward the gum; occluso-gingivally this is called. On looking over the literature on this subject I find these ideas advanced: "That all approximal cavities having adjoining teeth in position should have the margins of the cavity toward the gingival so extended that when the cavity is filled a healthy gum septum should cover that portion of the filling." (I have made a few contentions along this line myself.) There are some who allege that this extension of the cavity-margin is not necessary, and that it will not be a factor in preventing the recurrence of decay after the cavity has been filled. Many articles are found in the journals in regard to this subject. Many able men allege that permanent work can be made only where the gingival portion of the filling is covered with a healthy gum septum. Others, who are considered by many as able men, contend that this practice is a barbarous one, and is not essential.

I have views of my own regarding this, to which I should like to call your attention a little later on. I have on several occasions had the pleasure of hearing men argue against this occluso-gingival extension with so much vehemence that I have at one or two meetings asked, after adjournment, what their objections in reality were. You can perhaps imagine my feelings when they have said, "I protest against following methods of this kind for this reason: All the enamel should never be cut away at the neck of the tooth, as it makes a much better margin than the cementum." Now, gentlemen, this answer was given me by a well-known teacher of operative dentistry. I said to him, "Having a healthy gum septum covering the gingival portion of our fillings does not mean that the cavity is so extended that all the enamel on the mesial or distal surface that lies between the margin of the cavity and the cementum is to be removed; far from it." "But," he quickly replied to me, "unless you do remove all the enamel up to the cementum you cannot get a healthy gum septum covering that portion of the filling." I can understand some things, but I am free to confess that ignorance of this kind in a teacher of operative dentistry is entirely beyond my comprehension. It may have been advanced in the times gone by, and I believe that in the long ago somewhere I have read it, "that the enamel lying between the cavity proper and the cementum should be entirely removed;" but this is not necessary, and it is not what Dr. Black has taught me, nor has he led any one, nor have I, to believe that this was our practice. The gum usually covers the mesial and distal surfaces of the enamel on bicuspids and molars from one and one-half to three millimeters; therefore the extreme ideas advanced by those who bitterly oppose occluso-gingival extension are not understood. Extending a cavity-margin one millimeter, or a trifle more, occluso-gingivally, so that a healthy gum septum may cover that portion of the filling, is something I feel that no sane man can protest against. I cannot understand why my opponents in this matter, who have fought with so much fervor, have not become acquainted with these facts. If they had simply taken a handful of extracted teeth and studied the relation of the gum to the mesial and distal surfaces, they could have noted to what extent the gum covers the enamel, and thus not be chagrined later on to find they were battling for a wrong cause. It is also impossible for me to understand why some who have fought these later teachings have not studied out the cause of their failures when year after year their patients have returned to them with recurrence of decay around the margins of their fillings, that they had taken such great care to have as near right as possible.

A patient, who came from one who follows this method of not covering the gingival margins of his fillings with a healthy gum septum, informed me the other day that her teeth had to receive attention every six months, as they decayed so very rapidly. If some of those who have so bitterly fought this advance in the formation of cavities could have examined these fillings, I firmly believe they would have been my strongest advocates in calling the attention of the members of the dental profession to the necessity of having the gingival margins of all approximal cavities covered with a healthy gum septum. They would for all future time have fought for this with ten times the bitterness that they have ever opposed it. Just imagine, gentlemen, thirty-one approximal gold fillings, the most beautiful work the eye of man ever rested on. Nineteen of these had recurrence of decay around their margins so well defined that it amounted to a well-formed cavity. A month previous to visiting me she had been to her dentist, who told her her teeth were in first-class condition (they were, for refilling). This patient also informed me that the great majority of cavities around the fillings were due to her having "soft teeth," and her dentist told her that

that was the reason why her teeth had to be refilled every two or three years. For twelve years she had consulted the same dentist, who merely removed the old fillings, extended the cavity a trifle, and refilled them, only to have a recurrence of decay take place. It is not my intention to lead any of my hearers to believe that had these teeth been filled so that a healthy gum septum had covered the gingival margins of the filling this state of affairs would not have occurred. It is not that; but I firmly believe that had this been done two-thirds of the trouble would not have taken place, nor would the teeth have been in such a deplorable condition. Why? The gingival margins were not tight; they leaked, as do ninety per cent. of the gingival margins that are made with cohesive gold. If those leaky margins had been protected by a healthy gum septum they would not have decayed with one-half the rapidity. I contend that the most difficult operation to make to-day in dentistry is a tight gingival margin with cohesive gold in a small approximal cavity in a bicuspid or molar. One cannot see what he is doing, and all is simply guesswork. Rule: Approximal cavities in these teeth should be extended in all directions, so that their margins are perfectly visible, and so that step by step, as the work progresses, one can see how it is made.

I have made the statement that the gum covers the enamel on the mesial and distal surfaces of the teeth heretofore mentioned from one and one-half to three millimeters; this, as age increases, shortens. It is also shortened by the careless use of wooden toothpicks, floss silk, no contacts on fillings, faulty contacts, permanent separations between teeth or fillings, etc. The mesio-distal wear of the teeth is also guilty of causing the gum septum to materially shorten. With this knowledge clearly before us we can readily see, if we believe in any gingival extension of the cavity-margin, that it would be well to extend our cavities a trifle beyond the usual gum line, and thus for many years have that portion of the filling covered and not exposed to the action of the micro-organisms. We may thus be spared the mortification of having patients return with a cavity of decay beside our once carefully made fillings.

There is one phase of this matter to which attention has never been called, at least not to my knowledge, and that is the thinness of the enamel at the gingiva. If a buccal section of a tooth is examined, we find the enamel is thickest as a rule at the occlusal; it always is in unworn teeth. As the enamel approaches the cementum it gradually becomes thinner, and where the cementum overlaps it is thinnest of all. I believe there are more recurrences of decay that can be directly traced to the careless use of polishing strips than we at present think of or are willing to acknowledge. I have been observing men polish approximal fillings for several years, and in the use of strips in particular I have observed some who were most careless. This can also be said about the rotary disks. I am unwilling to state what fearful havoc I have seen produced through their careless use, great hollows and valleys above or below the gingival line of the filling. All this does much harm, and is the direct cause of future trouble. We do not see it often on account of the gum covering it; if it were not for this one thing we would be compelled to have special teachers in our dental institutions to teach men how to properly trim and polish fillings.

It can be asked, and with much truth, how I know a healthy gum septum is of so much benefit. I will answer this by asking you in return to examine any considerable number of teeth that have been extracted that have approximal fillings in them. I do not think it would be possible for you to find any evidences of decay around the margins that have been covered with a healthy gum septum. Examine the fillings for the patients that consult you; make a careful comparison of the different fillings, and you will find there is no recurrence of decay around the gingival margins of those that have a healthy gum septum, provided extension for prevention has been the method followed. I have at the present time two patients under my care. The fillings were made by the most celebrated dentist in the profession; the majority of the work for one was made in 1871. The greater mass of these cavities were extended occluso-gingivally, and linguo-buccally as well, and every cavity filled in this way is perfect. Those that were not so extended failed. While I was writing this article a patient from this selfsame man came to me. He had numerous approximal fillings. Examination showed that several had failed, but those which had been well extended were as perfect as when made seventeen years ago; and seventeen years from now I believe those fillings that have been extended and are in such perfect condition to-day will be equally so then. I ask of you to examine the next one hundred gold crowns that you meet with, and you will find just one in the one hundred is about perfect. You will be able in ninety-nine cases to run your exploring point under the margin of the gold; that, at least, is my record. Next take one hundred approximal fillings in bicuspids and molars, and if you do not find overhanging margins in about ninety-five of the cases our records will not agree. If the overhanging margins of the gold crowns and fillings are not protected by a gum septum within twenty-four hours after the filling has been made or the crown set, the trouble usually begins, and only ends with the cavity of decay beside the filling or crown. If, however, either is protected by a gum septum it may be many years before that trouble is heard of, provided the overhanging margins are not such as to be irritants.

I firmly believe it is full time for the men in the dental profession to band themselves together for the study of those principles and methods that have been thought out for the good of suffering humanity, and our own as well. There is certainly one method much better than some other, and it simply costs him who desires to pick it up a few hours of study. I think it is worth the time. I think it is time for the men in our profession to settle once and for all time this matter of cavity preparation. A few of us have been laboring to have some sort of settlement with those having different ideas on this subject. In no other profession or in no other handicraft is there any such marked divergence of opinion shown. Let the teachers of operative dentistry meet each year and settle their differences, and thus have practically a universal teaching in our dental colleges. If a teacher feels he is unwilling to accept the advanced ideas, let him step to one side and make room for some one who has greater skill and knowledge; one who accepts the newer teachings, who has courage to assist the rise of a rational opinion to its just place. In this way much benefit will accrue to those who have the advantages of the latest and best teachings. And how can the members of the dental profession also receive this benefit? This has been asked me a number of times. Let those dental societies whose members are interested in obtaining this knowledge send for some well-known man who is a good operator, and let him make two operations for their benefit. Not an ordinary clinic, for the arrangements there are the worst possible to be conceived, but have the operation take place in a lecture-room, or erect an amphitheater. Each and every one can see the operation from beginning to end. The one operating can call attention to every important detail. Everything can be explained as the work progresses, and a general discussion may follow the completion of the operation. By pursuing this method much knowledge can be gained by every one interested. At the next yearly session the services of another operator can be engaged to make similar operations to those made by the previous operator. A comparison of the skill and ability shown by the two operators will do more good than anything else that I can at present think of. The expenses of those invited to be operators should be paid; at least railway fare and hotel bills. I know of several excellent operators who could ill afford, without compensation, to leave their homes and business and journey to some distant city for the purpose of giving others instruction. The honor of an invitation to operate before any of the members of a large organization is indeed great, and should in itself be all-sufficient, but there are men who have large families and small incomes who from necessity must remain at home. Their sphere of usefulness is curtailed in a measure by the slenderness of their purse.

No one knows how much pleasure it gives me to be with you this year, for there are few things that give me greater pleasure than to attend dental meetings. If there is even one in your large audience whom I have interested sufficiently in this subject so that he will on returning home examine with much care the work that comes into his hands, and thus glean the information from his observations that others have obtained, I shall feel amply repaid. I desire to express my most sincere thanks for your kindness in inviting me to clinic and to write this paper, and hope that great and lasting good may be the outcome of your meeting.

[Dr. Wedelstaedt exhibited a large number of teeth which had been extracted after having fillings in them, showing that in cases where there was good extension of the gum up to the gingival margin of the filling decay did not again attack that margin.]

Discussion.

Dr. H. C. THOMPSON, Washington, said the anatomy of the tooth shows us that the enamel is made up of prisms, which hold the relation to the tooth that bricks hold to the mason's arch; and in repair of the teeth we must have due consideration to the repair of the arch, so that no part of the enamel-wall will be left unsupported.

We must also have consideration of attrition that the restoration will be subjected to; also the relations of the cervical wall of the filling to the gum, the form of the tooth in relation to the arch, and to the line of pressure and attrition.

Dr. Clarence J. Grieves, Baltimore, said we have in this section of the country operations that were done thirty years ago and more, fillings made with permanent separations of the teeth. These cause suffering every time a meal is eaten, because of the food being forced down to press on the gum. It is true that those old operations are more permanent, but the present contour fillings are without question better. The reason they last so well is because the reduction of so much tooth-substance reduced the size of the cavity and relieved the filling of the strain that is so destructive.

Dr. M. F. Finley, Washington, said the old-fashioned way of filling with soft gold did preserve teeth, but was far less comfortable than the modern way of building up the contours with cohesive gold.

Dr. C. C. Harris, Baltimore, said the matter had a personal interest to him, as one of the members present had filled a tooth for him; and, though he was careful to caution the operator to leave no space for food to crowd down to make him uncomfortable, the use of a thin rubber-dam had left a space which was enough to cause him much discomfort. He intended to have the work done over and the space filled up.

Dr. Wedelstaedt said he was glad Dr. Thompson had spoken of the necessity of preserving the enamel arch. To leave overhanging edges of enamel and then to hammer them with a mallet breaks up the enamel-rods and insures the return of decay within two or three years. The usual way of preparing these cavities is to place a little bit of gold in an anchorage point just under the enamel, and every blow of the mallet breaks the enamel down. The edge at the gingival margin should be cut square, and not with overhanging enamel; and the first piece of gold should be put in the angle of the cavity away from the approximal wall. In this way only can we get tight cavities with cohesive gold. He, however, did not use cohesive gold much in approximal cavities.

When he began to fill teeth he did not know what cohesive gold was; he used cylinders, and his operations of that day were good yet, or a large majority of them at least are; some of them failed. From our failures we learn to do better work; the thing is to avoid repeating the same error to bring further failure. With soft gold there was no heavy malleting, and the specific gravity of those fillings was as great, or greater, than that of the cohesive fillings made to-day.

It is not always practicable to do work just as you would prefer. For instance, when a cavity is small and does not extend so that the gum will cover the margin of the filling, the patient will object to your enlarging the cavity. In such cases he fills the cavity, considering it a temporary operation, knowing that it will have to be refilled in four or five years. For a permanent operation we must enlarge the cavity to have the gum cover the margin. Cut the cavity far enough lingually so that you can look in and see that margin, whether it is a central, a cuspid, a bicuspid, or a molar. It is free from all contact with adjoining teeth; you can see each particle of gold or amalgam as it is placed in position, and you can have definite knowledge of what you are doing. Without being thus able to see each step of the work you cannot expect to get it perfect.

Dr. A. W. SWEENY, Washington, asked Dr. Wedelstaedt what figure sensitiveness of the dentin cut in this enlargement of cavities.

Dr. WEDELSTAEDT said he was not troubled with sensitiveness, and had never used a cataphoric outfit. In closing, Dr. Wedelstaedt thanked the members for the courtesy and attention with which they had listened to and discussed his paper.

The subject was passed.

Dr. B. HOLLY SMITH, chairman of the Committee on Operative Dentistry, read the following as the report of the committee:

REPORT ON OPERATIVE DENTISTRY.

Mr. Chairman and Gentlemen: My obligation to this meeting and to my local society I supposed would be discharged in a somewhat different way from the one in prospect. My hope was that as chairman of this committee I had but to notify the members that so much would be expected of them, and to see that this was properly presented. In answer to my demand for co-operation, however, I received one promise of a paper,—namely, from Dr. Chas. E. Duck. Some of the others gave excuses. Some did not do me the honor to acknowledge the receipt of my appeal. Nevertheless, I have no apology to make for the members of my committee; they are all good fellows, and, as far as I know, good operators and capable practitioners. I am disposed to think that innate modesty and overwork are responsible for their failure to do themselves credit to-day; and, in the absence of this consummation "devoutly to be wished," I must ask you to indulge me while I present some thoughts, or, if not *thoughts,* some *words,* which, let us hope, may provoke thoughts and discussion upon a subject which we cannot afford to pass without consideration.

Operative dentistry is our excuse for existence. No nebulous maze surrounds and beclouds its practices. No legendary and empirical traditions guide its votaries. No homeopathy, faith-healing, or Christian science confuses, disturbs, or unseats its followers. Its advance is marked by the application of scientific principles to materials and forces. No mystery surrounds its successful practices. No accidents of temperament or idiosyncrasy can interfere with its achievements. And yet the personal equation must always play a large part in the success of those who make operative dentistry their life-work. Men are not equally endowed by nature, and skill and cleverness, as well as study and observation, are essential to successful dental operations.

The lack of this skill and the disastrous results which invariably follow the effort of those who do not possess it has expressed itself in the manufacture and use of numerous forms of plastic preparations of gold, advocated and used because they are easy of manipulation. The time is ripe to say that they have all been disappointing; not that they are useless, but that their ambitious advocates have claimed too much for them. No practitioner is well equipped who excludes from his office or armamentarium plastic gold, but he certainly is deluded who essays to use this to the exclusion of all other preparations. It is helpful as a starter, or even a time-saver under favorable conditions, but must be covered invariably by extra cohesive foil, and not depended upon in extensive contours. Not that contour fillings, and beautiful ones, cannot be made with the plastic golds, but the stress-resisting qualities do not compare to those of the cohesive foil, and do not measure up to the necessities of such work.

As an educator I sometimes doubt the propriety of advocating (to students at least) the use of the materials that make dentistry easy. After skill has been acquired an operator may be trusted to use any material, but no material can be used successfully by unskillful hands to stop teeth; and no operator will acquire the requisite amount of dexterity to do major, or even minor, operations, with cohesive gold foil by practicing with plastic gold. We are forced to the conclusion, therefore, that the blessings of plastic gold are not without alloy, even though the gold may be pure.

The profession is to be congratulated upon the publication during the past year of some most helpful papers on operative dentistry, or, more properly speaking, "A Few Considerations in Filling Teeth," by Dr. Johnson, of Chicago, in the DENTAL COSMOS. Dr. Johnson is not only a very clever operator, but he is a man of too much breadth of character to regard anything in a bigoted or small way; and in his treatise upon this subject he shows discriminating knowledge not only of cohesive gold, but of non-cohesive as well. It is time that the careful practitioners of dentistry stopped star-gazing and waiting for the ideal filling-material to be invented, and got down to hard pan, where they must learn to use skillfully and with discrimination the reliable materials which have enabled us to make a world-wide reputation as dental operators.

Too little attention is given to the preparation of cavities, and too little importance is attached to this step in the procedure; failure has resulted more frequently from this than from any other one thing. I cannot consent to the radical measures advocated by Dr. Johnson in all cases, but I believe his advocacy of cervical extensions will in the main be helpful to those practitioners who use good judgment; and I should misrepresent Dr. Johnson if I did not repeat the substance of what he says in the May DENTAL COSMOS,—viz, that no rules can be given which should be blindly followed in every case, as cavities have individual and distinctive measurements, and must be handled as special cases when they deviate from those described.

With the multiplication of machinery and the adaptation of forces the temptation grows apace to abandon all else for these, but I want to urge upon the younger members of our profession who may be present the faithful and painstaking use of the hand mallet. We all know the adaptability of some of the mechanical mallets to certain phases of our work, but I must say frankly that unless a man is an expert with the hand mallet he falls short of his opportunities, and cannot use to best advantage any other force. If you would know the possibilities of cohesive gold, and learn to fondle and love it, you must acquire the use of the hand mallet. Train your left hand to direct and your right hand to mallet it (not hammer and maul it until you have robbed it of its inherent property of cohesion, but to tap and drive it to place). Every contact of the instrument upon a surface which has once received the impact of the plugger is an injury to the gold; drive it home and let it be. Cohesive gold is as sensitive as a delicate flower; handling or jarring is injurious to it; learn to respect this, treat it with as much deference as you would your sweetheart, and you will learn to love it quite as ardently. Surely no sweetheart was ever more faithful.

I have the utmost patience and sympathy with those who, striving to cultivate the esthetic, are searching for ways and means to replace lost tooth-structure with a material which will not advertise its artificiality. I have therefore watched with great interest the development of the system of Dr. Jenkins, of Dresden, as exhibited by some of our clinicians. In some respects its results have been better than similar work attempted in this country. If it has done no more, it has stimulated our own workers in porcelain to a more careful effort, and to-day the furnace and the porcelain fillings baked in a matrix have become fixtures in the well-regulated office.

I am assured that an old and now somewhat neglected use of porcelain does not deserve to be abandoned. The fact is that no practitioner who is not resourceful deserves the patronage of the best clientele, and I think it can be said of dentists as a class that they have this quality to a higher degree than any other skilled workmen. The variety of methods and materials gives us a wide range of choice, and the responsibility of arresting disease and effecting restoration with harmonious and esthetic effect should at no time be lost sight of.

With this end in view, I do not know of a method which produces more gratifying results than the grinding in of bits of porcelain to fit and fill labial cavities in the incisal region. No approval can be given to the filling of these cavities with gold when they are exposed to view.

The cavity being prepared with regular outline, a section of the English tooth, matching in shade, can be ground to fit and quickly cemented in place. It leaves little to be desired as to appearance. The piece of porcelain may be chipped or cut with forceps, nibbling it with the blades, until it approximates the size. It is then attached to a match-stick with shellac and ground on a smooth stone until it fits the cavity with only the thickness of a hair at the margin. I have some of these inlays which have been standing for more than ten years. Some of them replaced gold fillings, and I am free to say that they have brought me more patients of the desirable class than any individual operations I have ever performed. With a little practice one of these inlays can be ground in in less than an hour, and any patient will pay ten dollars cheerfully to have a gold filling replaced by one of these. If the cement should wash out, it can be replaced with the least trouble imaginable without displacing the inlay. I never knew one to be lost. When the porcelain inlays, which are baked for individual cases, can be made to match invariably the shade of the tooth, they may supplant entirely the ground inlays; but, in the absence of a furnace or the degree of excellence in the process indicated, the inlays described should be more frequently used.

Probably no subject of the same relative importance to our specialty has received more attention, both in essays and clinics, at dental meetings than the subject of cataphoresis. Unquestionably it has been of great advantage. The experimental stage has been passed long since, and this method of forcing medicaments into and through tissues is a demonstrated success. Since the introduction of the ethereal solution of cocain under the name of vapocaine, however, the battery and apparatus are in many cases of moderate sensitiveness superfluous. The application of vapocaine to a sensitive dentinal surface at first produces a slight twinge of pain, but it rapidly subsides; and in my experience most cavities have been so obtunded as to admit of heroic operations without pain. I have not attempted the extirpation of the dental pulp, nor have I altogether abandoned the use of the cataphoric appliance, but I use it infrequently and get on just as well by the help of vapocaine.

I have had most success in the use of this obtundent through the following method: Apply it first to the moist cavity; allow it to remain for a short time, then desiccate the cavity and reapply it. I think that, applied thus, the first painful impression is not so profound as when the cavity is first desiccated and then saturated with the vapocaine. My impression is that this preparation is one of the many helps of which the resourceful operator can avail himself in practicing painless dentistry; and if it is not invariably successful there is a method that will succeed, and it must be found. It certainly should not be impossible to avoid pain in dental operations to-day, though it is possibly still inflicted; probably because it is too much trouble or takes too much time to go around it. The younger patients growing up, who place implicit confidence in our ability to repair their ills without inflicting suffering, bear convincing testimony to the efficacy of these methods; and many of riper years are very appreciative of these improvements in modern practice. We all remember when it was the accepted idea that the best attention was only purchased at great cost in suffering. Unquestionably the heroic alone survived such teaching; many resolved to suffer loss of denture rather than consent to the suffering necessary to its protection.

In the well-regulated dental office, where patients come with such preconceived ideas as these, the work must be thoroughly done, but painlessly as well; the operator must not think of using cold water to spray or cold air to blow out *débris* from a sensitive cavity. In the adjustment of the rubber-dam much discomfort can be avoided by ligating only a few teeth; by tucking the dam carefully under the margin with the blade of a burnisher; by tucking a little rope of cotton saturated in sandarac varnish between the teeth before the ligature is applied, so that when it is tied it will not force its way sufficiently far up under the gum-margin to cause pain. In the adjustment of clamps thin tubes of rubber may be slipped over the tips to avoid their cutting the gum. These and a thousand other little attentions will yield wonderful harvest in confidence and tractability on the part of our patients. Let an experience of my own serve as an example.

Partly from convenience of location, and partly from my disposition to be loyal to old associations and friends, for many years I have patronized a certain tonsorial artist. My visits were always attended with dread of discomfort on my part and chidings for my tardiness on the part of the artist. The man has a good business, and handles the scissors and razor cleverly, though the subject somewhat roughly. In jerky tones he directs you to "Sit up;" then he digs his finger-nails into your neck in an effort to tuck in the apron; the sharp tooth of a comb is sometimes struck into your scalp, your eye punched, your nose pulled, and the ice-cold clippers run over your neck until your marrow is chilled and goose-flesh stands on your back like molehills; when you get home the sensation of a handful of hair down your back doesn't make you feel more cheerful. And yet for years I endured this and all manner of roughness, but dreaded to go, and wore long hair on my face and head.

Now all this is changed. By accident or emergency I employed another. His very touch soothed me; he didn't lay the weight of his whole hand on my face and head, but let it glide gently over with the smoothness and elasticity of a man who tried to see how carefully he could handle me. He insinuated a little roll of raw cotton inside my collar to catch the hair; he warmed his clippers; the comb scarcely seemed to touch the scalp. I was soothed and almost lulled to sleep. What an immeasurable difference!

I do not belittle our calling when I say that I got a lesson from this experience which I wish every man who practices dentistry could have: dexterity, cleverness, gentleness; these three graces adorn the dentist; let's wear them.

I desire, before closing, to commend to those who have not as yet considered it, compressed air as an essential in the operating room. I am led to do this more particularly because of my feeling of embarrassment recently when my apparatus became disabled after some years of faithful service. I really felt undone without it, and say freely that I would not be without it any more than I would without an electric motor to run my machinery. As a chip-blower, a spray, a desiccator, a diffuser of medicines in root-canals, to chill impressions of wax or modelling compound, to blow back the gum and clean out the blood in operations for pyorrhea, it is simply invaluable.

My apparatus is simple and inexpensive; a duplex beer pump, two iron retorts or discarded hot-water boilers, a bit of pipe, steam gauge, rubber tubing, etc. Thirty to forty pounds of pressure are ample, which can be secured by twenty pounds of water pressure, the pump being constructed to produce double the amount of pressure in air which you have in water.

Please believe that these remarks are not made in arrogance or with the thought that to many of you they are not perfectly patent. I hope, however, they will invite other and more valuable suggestions, and that, altogether, some may be helped and strengthened in the correct and successful practice of operative dentistry.

Dr. E. K. WEDELSTAEDT, St. Paul, Minn., said that he had placed two fillings made by Dr. De Trey, of De Trey's gold, in the hands of a chemist to learn the specific gravity, and it was 18.36. He had tested the specific gravity of a great many of these fillings which he had made himself, and never got 16.36 by his own measurement. He had recently asked one of his former students who had been practicing several years what he was doing with plastic gold, and he said it was the best thing he had ever seen, "because you can take a piece a little larger than the cavity and make a filling in three minutes; just so the margins are tight, it does not make any difference about the rest of the filling." He hoped none present were deluding themselves in this way. It does make a difference about the interior of the cavities. He had specimens of plastic gold fillings in which you could trace moisture straight through the filling down to the tooth. The filling was full of cavities which no doubt contained micrococci, and without doubt such teeth will decay under the filling. In some experiments he made in 1895 he had fillings made by the automatic mallet, so as to ascertain what specific gravity he could obtain. He found that it took five pounds six ounces at the long blow to close the mallet; the short blow took two pounds six ounces. He then took gold and made pieces weighing twenty-five milligrams, and condensed the pieces with twenty-five and fifty blows to each piece. With twenty-five blows he got a filling of twelve specific gravity, and fourteen specific gravity with fifty blows. You cannot possibly expect a filling of this character to keep the moisture out of a cavity.

In regard to porcelain fillings, he thought of all the humbugging ever perpetrated on the dental profession, the worst was the porcelain filling. Until we get a cement that will prevent moisture from running through into the cavity they cannot be permanent, and we have not such a cement now. Water and micrococci both penetrate. Try cement by dropping it in a bottle of ink for a day; then break it open, and you will find it stained right through. An oxychlorid cement will not do this, but you cannot use it except in pulpless teeth. The matter of cement in connection with porcelain fillings is of prime importance. Men who are sane on every other subject seemed cracked on this subject of porcelain fillings. The closure of the mouth is so strong in many cases that no porcelain filling can possibly stand the strain.

The subject was passed, and the following paper, by W. W. H. THACKSTON, M.D., D.D.S., was read:

THE CODE OF ETHICS.

Mr. President and Gentlemen: May I ask on this occasion and in this honored presence whether the ethical code adopted and subscribed to by the National, district, and state dental associations, as well as by all regular graduates of universities, colleges, and professional schools, is now a vital law or a mere "figure-head," a "dead letter" upon our professional statute-books? Or has it been suspended or remitted to the shades designated by our national ex-president as the "realm of innocuous desuetude"?

If our "code" is a living law it should be respected, its provisions observed, its violations recognized, and its penalties in some way practically enforced.

It is patent to the most casual and careless observer, and most sadly apparent to the conscientious and honest practitioner of dentistry, that after all the long years of patient and persistent effort to advance and elevate the dental profession to the plane of a "liberal department of general science" the humiliating spectacle of a dishonored calling, a stained and soiled escutcheon, confronts us in every city, town, village, and rural district of our common country. Regular graduates from our universities, colleges, and training schools are reported to us as affiliating with impostors and charlatans, as flocking into "dental parlors," as subsidizing the secular and religious newspapers, and flooding every homestead in the land with announcements of "painless operations," of their unrivaled skill, their college degrees, and their unprecedented rates of charge; their fee bills of twenty-five cents for fillings, a dollar for gold crowns, and two dollars for sets of teeth, extracting teeth free; and all work warranted and guaranteed, etc., the operations being performed by graduates of skill and experience.

It has been my choice and lot to reside and practice in a comparatively small town, the ancient home and heritage of my ancestors and more immediate family, and for largely over half a century I have been a close observer of everything relating to the progress, welfare, and general advancement of the dental profession; its rise in public sentiment and appreciation from a humble, an occult art to a recognized and accepted department of science; from a trade and handicraft to a "learned and liberal profession." In all this betterment I took pride, and contributed what aid and help Providence had placed at my command. I rejoiced in the wonderful growth and development of dentistry as a scientific and honorable vocation. But, alas! I have lived to witness a "turn in the tide;" to behold what appears to be a retrogressive movement, a lapse from the principles of honor and truth to the tricks and devices of the base and depraved; from reputable and virtuous associations to consort and fraternization with the unclean, the polluted, and the leprous.

I am pained beyond expression to have to admit that in all my observation and experience I have never seen the character of dentistry as a profession more debased and its status on a lower plane than in this almost closing year of the nineteenth century. This declaration may surprise and startle, and may arouse doubts in the minds of our more fortunately located brotherhood of the large and affluent cities, who command the patronage of the worthy, the cultured, the refined, and the appreciative. These gentlemen can hardly realize the fact that, with few exceptions, the people of the small towns, and especially those of the rural districts, are largely if not wholly influenced by the lowest figures with which they can have their dental wants and needs supplied. With the rustic and the ruralist "a dentist is a dentist;" and if he can find one who promises to extract his teeth free of charge, fill them for twenty-five or fifty cents, and furnish a full set of artificial teeth for two dollars, or the very best for five dollars, the honest, conscientious, and qualified dentist is given the go-by, and the "cheap man's" service is preferred and accepted. I am not disposed to be severe or censorious; I am only stating facts as they exist,—facts confirmed by the advertisements of the press. I am not writing for any personal advantage or prospective benefit to myself; I am contributing this paper solely to the welfare of a profession to which I have devoted the labor of a long life, a profession I love with growing and abiding affection. I am not writing against the "bushwhackers" and "swamp angels" of dentistry, the untitled and those without the pale of recognition; such are beneath the notice and contempt of professional gentlemen; but I am writing at and against the graduates and degree men of our calling who are dishonoring a code of ethics which they have pledged word and honor to accept, abide by, and sustain. I personally know nothing of "dental parlors," have never seen one, but I am informed by individuals who have been the victims of such "dead-falls" that therein may be found graduates from our most reputable schools and colleges, with diplomas from our distinguished and noted institutions conspicuously displayed as evidences of qualification and testimonials to the unchallenged character of the holders.

Now, if these allegations be true, and they appear to be fully corroborated by the testimony of reliable men, as well as by the circulars and newspaper advertisements with which almost every homestead in the land is flooded, what remedy should be imposed upon the graduates and degree men who are playing traitor to the profession and to the reputation and honor of the schools and colleges whose trust and confidence they have basely outraged?

In a paper prepared for the St. Augustine meeting of the Southern Branch of the National Association, at the request of President Beadles or one of his committee, I suggested as a possible means of checking the influx of unworthy men in our profession the exercise of more careful discrimination in the admission of matriculants in our schools of learning, the co-operation of the college faculties and the boards of state examiners in exacting, from each applicant for graduation and for the examining boards' license to practice, a written or printed and signed and sealed pledge and obligation from each and every graduate and party licensed by the boards, to accept and observe strictly the provisions of the ethical code enacted and adopted by the National and state dental associations, said pledges and obligations to be held and filed in the archives of the schools and examining boards, and to be so drawn as to provide for the surrender of the diploma, the revocation of the degree and state board certificate, after fair trial and conviction of default, or disregard of the provisions and requirements of the "ethical code." And, further, that publication in all such cases be made in the transactions of the schools and boards of the profession. The St. Augustine paper alluded to was, as the present paper is, merely suggestive. Something should be done, I think, to check the demoralizing and downward practices that men openly, and apparently with impunity, dishonor dentistry and reflect shame and reproach upon a necessary and benevolent pursuit. My suggested remedy may appear stern and harsh, but in sober truth the good men and worthy, the upright and honest, never need fear an "ethical code;" the unscrupulous and unprincipled can only be restrained and controlled by severe pains and penalties. I have seen nor heard nothing of the St. Augustine paper. I have seen nothing of the transactions of that meeting, and do not know whether the paper was received or lost in transition; and for that reason I have chosen the same line of thought for this essay. I beg to repeat that I have no personal end to subserve. I have no fears for myself, and no near relative to succeed me. With the help of a kind Providence, I think I can take care of myself. I am writing and working more for the benefit and welfare of a calling I shall never cease to love and revere, and, while realizing that I must soon lay it down, I shall grieve to pass away under the conviction that its glories were dimmed and its flag trailing in the mire and the dirt, and trust that some plan may be devised to check and wipe out an evil that now menaces and threatens the character and future prospects of an honorable calling.

Discussion.

Dr. H. B. Noble, Washington, said the profession was disgraced by the advertising dentists, and there was no difference of opinion about it; and the worst of it was that diplomaed men were connected with such institutions. The remedy proposed of exacting a pledge from all students might seem practical, but it was doubtful whether examining boards would or could enforce such a pledge. It was attempted one time at the Maryland College, and Dr. Hurlbut, of Massachusetts, drew up such a pledge. It seemed very nice to have the students promise, but he doubted whether such a promise would have any effect. Such case, however, may be reached by passing a law which would take from these disreputable practitioners their diploma, and thus publish to the world their disgrace. In Connecticut the commissioners can cite a man before a legal tribunal to prove whether he is living up to the code, and if it is proven that he is not his license can be taken from him; but this must be before a legal court. The only way is to get, if possible, only honorable men into the profession. There seems to be no way to reach a man after he has got into the profession. The worst feature of the business is that it is difficult to educate the public so it will be able to distinguish between a professional man and the quack. It is hard to understand why the public put so much confidence in these advertisements. They say, "These men are graduates of college; they guarantee their work; why are they not so good?"

The only way would be to withdraw the diploma or the license to practice; and to withdraw the diploma would not be easy, as it is only a certificate that they have passed through the college. But if we could have a legal way to cite a man before a court and withdraw his license, it would at the least expose him.

Dr. WILLIAMS DONNALLY said we all know Dr. Thackston, and are glad to hear from him on this subject, but he regretted that Dr. Thackston had taken such a pessimistic view of the matter. In former years the advertising man was not a graduate, but now the man who expects to go from place to place violating all professional laws and ethics feels the necessity of being protected; and many of them have passed very good examinations, and they are therefore so much better than the advertising class used to be.

No law can help us uphold the ethical character of our profession. We can only hope for the slow process of educating the public.

There is a call from all over our land for an interstate recognition of licenses. If we can make the interstate recognition of a man depend upon his reputation where he has practiced, it would be a restraint on the quack. In the mean time it is comforting to believe that the people not only in the large cities, but all over the country, are learning to distinguish between professional and quack practices.

Dr. G. H. CLAUDE, Annapolis, Md., thought that the establishment of a standard of fees for dental services, to be lived up to by all professional men, would do much for the betterment of the profession.

Dr. A. W. SWEENY, Washington, said there was no way to legislate honesty into a man who had no desire to be honest and reputable, and no law can make a man charge certain fees for his work. A law that requires that every man, no matter what his attainments are, must stand an examination before he is allowed to practice in any state is wrong. The examining board should have discretion in this matter, and the reputation a man has in the state he has already practiced in should have its weight in determining whether he should stand an examination or not.

Dr. DONNALLY said that there was a great deal of agitation all over the country for the unification of dental law. We know that the examining boards and the colleges are not all what they should be, but we also know that there is earnest effort to get a higher standard. The fact that some of the examination boards are not all they should be shows the need of hearty co-operation of all who would work for a better condition. There should be no antagonism between the examining boards and the colleges. The College Faculties Association is doing all it can to bring the colleges together and to get better work in all, but there has been no effort to bring the examining boards together and get them to work alike. We all need to get together to accomplish the best results.

The subject was passed, and, there being no further business, the convention adjourned to meet at Old Point Comfort, Va., next year.

ANNUAL CONVENTION OF THE SEVENTH AND EIGHTH DISTRICT DENTAL SOCIETIES OF THE STATE OF NEW YORK.

THE Seventh and Eighth District Dental Societies of the State of New York met in annual convention in Rochester, October 24 to 26, 1899; Dr. Frank L. Sibley, Rochester, presiding.

FIRST DAY—*Morning Session.*

The convention was called to order at eleven o'clock, and listened to the reading of the minutes of the last session; after which the president made a short address of welcome to visiting members. The convention then adjourned till 2 P.M.

Afternoon Session.

The convention was called to order at two o'clock, and the following paper was read by Dr. J. F. KNAPP, Geneva, N. Y.:

ANESTHETICS IN DENTAL PRACTICE.

It is not the purpose of this paper to deal principally with the composition, manufacture, physiological or pathological manifestations of anesthetics upon the human system, but more particularly when their use is indicated in dental practice.

To the question, "Is the use of general anesthetics ever justified in minor surgery as relating to dentistry?" I answer in the affirmative, believing that the apprehension, suffering, and shock endured in many dental operations, particularly where a considerable number of teeth are to be extracted, work greater injury to the patient than the danger of the anesthetic.

It is also my belief that the use of local anesthetics containing a low percentage of cocain or eucain is indicated in many cases; that with all the harm that has been inflicted, due to their composition and use in the hands of unprincipled men, local anesthetics have wrought more good to mankind than evil. I have not sufficient proof to substantiate this belief, but *who* has the evidence that the opposite is true? Certain it is that more people do not have their masticatory apparatus properly cared for than do, and fear of the dental chair is the principal reason for this condition.

The prejudice of some against the use of these preparations is so strong that they have come to consider local anesthetic and nostrum as synonymous; and if they are, their use is an offense against the dental code of ethics. Webster gives the following definition for nostrum: "A medicine the ingredients of which are kept secret for the purpose of restricting the profits of sale to the inventor or proprietor." Therefore, a local anesthetic the ingredients of which are known and printed upon the bottle is not a nostrum.

In considering general anesthetics, we turn to what is commonly called nitrous oxid (N_2O) as peculiarly adapted to operations in dental surgery, on account of its comparative safety, the small amount of time required for its administration, and the absence of bad effects. "No condition or idiosyncrasy absolutely contraindicative of the use of the agent is admitted."—Garretson.

I urge the use of this anesthetic for the immediate extirpation of pulps in anterior teeth, and for the extraction, for young people, of the first permanent molar, the largest and most firmly-placed tooth in the human anatomy.

A case is presented where from a blow or fall the central incisor is fractured, exposing the pulp. A piece of orange-wood is so shaped as to be admitted well into the pulp-canal. The fractured tooth is then grooved near the gum-line; entirely around its neck if possible. Small round burs answer well for this purpose. A round bur a little larger in circumference than the pulp-canal should be next inserted in the hand-piece ready for use. The patient is then wafted into oblivion with nitrous oxid for the few seconds needed to remove the remaining portion of the crown with excising forceps. The entrance to the canal is then opened with the bur if necessary, the orange-wood point lapped well into the pulp, rotated, and removed. This to be followed by the use of canal-cleansers. The operation for crowning can be begun almost immediately, and completed without the subsequent soreness so common where other devitalizing agents are used.

The other case is presented: that of a young person aged from seven to seventeen summers; telling of sleepless nights, sitting up with a broken-down molar of the type before described. If this young person is encouraged to take the chair with the words, "It's only a first tooth; the doctor will pick it out and not hurt you," there will be an impression of mingled pain and deception left upon that mind not to be effaced, and always a barrier to dental services needed. You advise the administration of nitrous oxid because of the usual vigorous circulation of young people, their usual lack of fear of the anesthetic, and also because you wish to perform the operation without pain and retain the confidence of your patient. But who shall administer the anesthetic? Having been told, both by dentists and physicians, that I had no right to administer a general anesthetic without the immediate presence of a physician is my excuse for raising this question, and not that I am seeking legislation to give the dental surgeon his just rights.

To take out of the hands of the dental profession (administering anesthetics for surgical purposes) what that profession has given to the world is bordering upon the absurd; but here is the law as it reads for the state of New York, Cook's "Criminal and Penal Code," laws of 1897, page 233: "A person (other than a duly licensed physician or surgeon engaged in the lawful practice of his profession) who has in his possession any narcotic or anesthetic substance, compound, or preparation capable of producing stupor or unconsciousness, with intent to administer the same or cause the same to be administered to another without the latter's consent, unless by direction of a duly licensed physician, is guilty of a felony, punishable by imprisonment in the state prison for not more than ten years." Three prominent lawyers interpret the foregoing as applying equally to dental as to other surgeons.

What has contributed to bring the use of nitrous oxid into disfavor with some probably has been some unpleasant experience brought about by promising how many teeth would be extracted without pain, and trying to keep that promise good by continuing to operate with the patient in a semi-conscious condition, or not paying close attention to details.

To successfully administer nitrous oxid all air must be excluded. Where this is done, there is no person who cannot be quickly anesthetized. To this end cloth-covered tubing should be discarded and plain rubber substituted, so that a leak can be detected at once.

Nitrous oxid, unlike ether or chloroform, contracts or stiffens the muscles; therefore a mouth-prop should be in position, all noise or talking avoided, and usually the patient carried to the point of stertorous breathing before attempting to operate. To go farther, nothing is gained, and you are fast approaching the danger point; and danger lies in venous congestion.

Finally, do not ask a patient to make an appointment with you harmonize with one with his or her physician while suffering all the torments of odontalgia, but administer the anesthetic yourself, not forgetting it is to the interest of all concerned to have a third person present.

Discussion.

Dr. W. C. Wilbur, Corning. In opening the discussion I am sorry I must differ so widely from the essayist in many of his statements. He would banish the baneful effects recorded by the use of cocain upon the human system, by making a proper distinction between a local anesthetic and a nostrum. We cannot close our eyes to the experience of the evils caused by even the low percentage of this drug in wisest hands. It is effective, but equally deceptive. The warning comes from all sides that when used on the soft tissues of the body great caution should be exercised. Could we predict with any certainty its effect upon the individual, it would form one of the greatest boons to mankind. We know when we give certain quantities of other poisons just what the result will be, but cocain is a law unto itself, with most erratic and arbitrary indifference to its past conduct or future popularity,—it acts as it pleases. Small quantities of low percentage giving alarming local and systemic symptoms at times, and under seemingly similar conditions large quantities of high percentage manifest no unpleasant symptoms whatever, but, on the contrary, with a charming buoyancy of spirit the patient may leave a ten-dollar note in your hand with profuse gratitude for favor received.

Cocain is not a nostrum *per se*, as the essayist says, but calling it by its true name does not change its characteristics. They are there in all their poisonous fickleness, and we would better beware!

The essayist next turns his attention to nitrous oxid, telling us how to administer it; cites two cases where we presume he thinks it especially indicated.

He says, "To successfully administer nitrous oxid all air must be excluded." I would state it rather, to get the best results from administering nitrous oxid all air must *not* be excluded. That anesthesia can be produced more quickly, as he claims, by the exclusion of air I judge that none will deny, but in the light of modern scientific experiment and tabulated experience the proper mode of administration requires the reverse method of procedure from the one indicated in the paper. My own experience has long led me to admit air. Oxygen would be better, I know, but not many of us have equipped ourselves with the necessary apparatus for that purpose; so I use atmospheric air, and for the following reasons (trying to avoid too many details): By admitting air one precludes as far as possible the factor of asphyxia in producing anesthesia; in other words, gets a purer anesthesia. There is very little, if any, of the embarrassed and deeply stertorous breathing. There is little, if any, cyanosis, the dark blue or purple suffusion of the face. There is little, if any, anoxemic convulsions. There is less dilation of the pupils, swelling of the tongue and adjacent structures, and rapid cardiac action. Paralytic cessation of breathing is very rare. We get a sort of soft snoring breathing, instead of deep stertor. Phonation is less likely to occur, and the duration of the anesthesia is lengthened, giving more time for operating. So, instead of carrying the patient to "the point of stertorous breathing," as the essayist advises, I would rarely, if ever, produce stertor. (Dr. Hewitt, DENTAL COSMOS, April, 1899.) The essayist makes also the statement that "nitrous oxid, unlike ether or chloroform, contracts or stiffens the muscles." (I presume Dr. Knapp means the muscles of the jaw.) In their anesthetic phenomena the three anesthetics are essentially the same, though they seem to differ widely, and, carried to the same point of anesthesia, the condition of muscular contraction will be found the same. The worst cases of muscular contraction of the jaw I have ever had have been when chloroform or ether have been administered.

This much for the administration of nitrous oxid. Now for the first case cited where its use is indicated,—where from blow on face the central incisor is fractured, exposing the pulp. Orangewood is sharpened, tooth grooved near gum-line, patient "wafted into oblivion" (the author's words), and necessary work of removing crown first and pulp afterward completed. Why "waft into oblivion" when it can be done so much easier without? These words sound pretty and attractive, and charm one almost into a gentle sleep. But the reality, "How I hate to take gas!" is the standpoint of the patient. And "How I hate to give gas!" the position of the operator, is attested by the many in every place who refuse to give it, and by those who do it from necessity; and by still the many others who give it as a convenience, but deep down in their hearts hate to give it. We dentists are timid creatures at best, though I know we are reputed as gloating vivisectors, and told that the future abode of misery will be a failure without us to practice our art. But we have to acknowledge that the dentist who loves to give nitrous oxid is the exception, the anomaly; and the patient, be he man, woman, or child, that loves to take it is the exception, the anomaly. Then it is, in passing, inconvenient, for not many of us have the requisite appliances near our operating chair, justly relegating that to a back room, all by itself. The electric engine is not easily conveyed from place to place (and the engine plays its part in Dr. Knapp's plan). If we hadn't something better, why nitrous oxid would be the thing to use perhaps, though many would say use electrolysis instead. But we have something better than either,—viz, saturated solution of cocain in chloroform applied on a small piece of punk to the exposed pulp, pressed with a ball of unvulcanized dental rubber gently at first for ten or fifteen seconds to avoid pain, and gradually harder and harder, and until full force elicits no pain; and then you may proceed with drill or nerve-broach at your leisure; no necessity of hurrying, assured that the pulp has been "wafted to oblivion," while the patient himself has had none of the awful dread that accompanies "taking gas." Some may ask, "Are you not going back on your previous assertions about cocain?" I answer the conditions have changed, and we are operating now in practically an inclosed bony space, where it is impossible for the cocain to reach the system.

Professor Foster, dean of the Baltimore College of Dental Surgery, I am aware, gave at the New York State Dental Meeting in 1898 a graphic description of the alarming symptoms of the stereotyped form of the toxic effects of cocain upon a woman who had applied to the college for the purpose of having a pulp removed. But he afterward found he had been unintentionally duped. The woman, I believe, had an attack of epilepsy, a form of disease from which she had suffered many years; and the symptoms had all been attributed to cocain narcosis. There has been no authentic case of poisoning under such circumstances, and we are absolutely safe in employing it in saturated solution. But I must leave other points to be taken up by others, as I have already talked too long.

Dr. FRED. MESSERSCHMITT, Rochester, said he had been injecting cocain solutions for two years, and had never had trouble except in one case, and this patient came around all right after receiving a dose of brandy. He always warms the solution, also his syringe, to a little above the blood heat, which lessens the pain. There was a preparation brought out by Dr. Curtis, of New York, called volasem, which was said to be an antidote to the effect of cocain.

Dr. W. W. BELCHER thought more satisfactory results come from the use of nitrous oxid that is free from air. Nitrous oxid is not an anesthetic, but an asphyxic, and the pure gas brings the patient to the state in which he has no knowledge of your operations more quickly and satisfactorily than it will if air is mixed with it. If the law in the state does not allow a dentist to administer an anesthetic without the presence of a physician, then the law should be changed, and every dental organization should work to get it changed.

Dr. D. H. WAUGH, Rochester, said he always excluded air from the nitrous oxid when he administered, with good results. As to the law in regard to dentists administering anesthetics, he had no doubt of their right under the present law.

Dr. W. A. WHITE, Phelps, said that in his early practice he had used anesthetics, but had a scare or two and discontinued their use. In regard to the use of local anesthetics, he thought they were more used as a means of advertising than out of a regard to the feelings or interests of the patients. An effort had been made to have the law allow dentists to administer anesthetics, but unsuccessfully. For some reason the members of the Assembly did not seem to think that dentists had enough knowledge to safely administer them.

Dr. PROSEUS said the difference of opinion in regard to local anesthetics was universal. In all communities some would be found who would not use them at all. He used a two per cent. solution of cocain, making a fresh solution every day, and never had any trouble but once. He had had trouble also with eucain A. It was a case in which he had to extract sixteen teeth, and the patient was very nervous, and moved around so that some of the eucain went into the fauces. The patient collapsed, but was brought around by an injection of strychnia.

The young practitioner must use local anesthetics when extracting, or his patients will leave him and go to the quacks, to his loss. Local anesthetics should not be discarded or denounced, but should be studied so we will be better able to discriminate in them and use them understandingly and safely. About the right of dentists to use anesthetics, if a test was made in the courts, he believed that it would be decided that a dentist who had a diploma from a first-class college was a surgeon, and that the right to use anesthetics could not be denied him under the present law.

Dr. F. A. SMITH, Geneva, said if air is mixed with nitrous oxid we are liable to cause a kind of intoxication, and sometimes you will be liable to have your furniture broken up by a patient while in this state.

Dr. KNAPP, in closing the discussion, said that he had the opinion of three prominent lawyers, who agreed that under the law dentists had the right to use anesthetics. Nitrous oxid, used more frequently than any other anesthetic in dental offices, was the safest of all. Dr. Colton, who used it more frequently than any other man ever did, said that in many thousand cases he never had had a dangerous condition consequent on its use. We cannot doubt that dread of pain keeps many people who need dental work done from the dentist's office, and the knowledge that anesthetics will or can relieve them from the suffering is all that we can offer as inducement to them. We know and appreciate the danger, and accept the responsibility in the practice of our profession.

The subject was passed, and C. H. NICHOLSON, D.D.S., of Rochester, read a paper entitled "A New Treatment for Empyema of the Antrum," which will be found at page 1244 of the current number.

Discussion.

Dr. W. W. COON, Alfred, said he had nothing but commendation for the paper, though lack of knowledge of the new remedy would limit his discussion. Being a new drug, but used like others that are familiar to the profession, its results as set forth in the paper seemed to indicate usefulness. In cases where he had to open into the antrum he usually made the opening through the bone a little lower than that through the skin, which became a sort of a little valve over the opening and protected it from infection from the mouth. He preferred the word germicide rather than bactericide, as all germs are not bacteria.

Dr. F. W. Low said he commended the paper, and was pleased that Dr. Nicholson had found a new method of treating this diseased condition. He would use the new preparation at the first opportunity, and hoped for as favorable results as Dr. Nicholson's case seemed to promise.

Dr. Nicholson said the reason he preferred to enter the antrum through the alveolus rather than through the canine fossa was, first, that it was easier, and, second, usually less objectionable to the patient. The trouble usually originates in a decayed tooth, and ordinarily the patient would prefer to have the tooth extracted rather than to have an opening made under the lip. You will find usually that the tooth perforates the antrum either entirely, or else there is nothing but a thin tissue between the tooth and the antral cavity. By treating through such an opening less pain is caused the patient and less trouble to the operator, and this course is altogether more desirable. Specialists in nose diseases when entering the antrum usually make a large opening, but the dentist has a much better way. The reports of the use of protargol have led him to expect that it will be very useful wherever a germicide is needed. He had used it in several cases, and always with good result. In one case of an abscessed root he made an opening through the gum and injected a ten per cent. solution each day for five days, when upon testing by injecting pyrozone there was no indication of pus remaining, a result much better than he expects to get after five treatments with any other drug. He hoped those present would use protargol in their practice and report the result.

The subject was passed.

(To be continued.)

NATIONAL ASSOCIATION OF DENTAL EXAMINERS.

The annual meeting of the National Association of Dental Examiners was held at the International Hotel, Niagara Falls, commencing July 28, 1899.

The following state boards were represented:

Alabama—Drs. Whitby and Hall.
Arkansas—Dr. Stillwell.
Connecticut—Dr. Parmele.
Delaware—Dr. Jones.
District of Columbia—Drs. Donnally, Finley, and Allen.
Indiana—Dr. Oliver.
Kansas—Dr. Lawrence.
Kentucky—Dr. Montgomery.
Maryland—Drs. McCurdy and King.
Massachusetts—Dr. Dowsley.
Missouri—Drs. Jenkins and Bartlett.

New Jersey—Drs. Meeker and Barlow.
Ohio—Dr. Bethel.
Oklahoma—Dr. Kirkpatrick.
Oregon—Dr. Keene.
Rhode Island—Dr. Davis.
Virginia—Dr. Mercer.
Wisconsin—Dr. Chittenden.

The first session began at ten o'clock, Friday, July 28, 1899; President George L. Parmele in the chair.

The president apologized for having prepared no formal address, but in greeting the association expressed the hope that its business sessions would be harmonious and prosperous, and that they would be conducted attentively, so that business of the association might be expedited as much as possible.

A communication concerning unification of state laws, by Dr. L. C. Bryan, of Switzerland, was read by the secretary, and referred to the Committee on Assimilation of State Laws.

The secretary announced the death of Dr. Abbott, of Manchester, Iowa, a former president of the association. The president appointed Drs. Oliver, Meeker, and Montgomery to draw up suitable resolutions of regret.

At the afternoon session application for membership was received from the Oklahoma Board of Dental Examiners, through Dr. E. E. Kirkpatrick, the accredited member of the board. On motion, the Oklahoma board was admitted to membership.

The report of the Committee on Assimilation of State Laws was presented by Dr. WMS. DONNALLY, the chairman, who first stated that the committee reserved the right to make a supplemental report if necessity arose therefor. (The report was published in full in the DENTAL COSMOS, October, 1899, p. 999.) On motion of Dr. BARTLETT, the report was laid upon the table for discussion at the meeting on Saturday, July 29, in order to have it discussed by a full representation of the states having membership in the association.

Dr. CHITTENDEN presented the report of the Committee on Colleges (Drs. G. Carleton Brown, J. A. Hall, Chas. C. Chittenden). The report dealt with the action of the committee in carrying into effect Rule 8 of the revised rules of the association, describing the character of the standard of preliminary educational requirement provided for in said rule, and the construction of the list of colleges recommended by the association as related to the rule in question. It further embodied the expressions of opinion from the deans of several dental colleges with respect to the practicability of enforcing Rule 8.

A general discussion of the report followed, dealing with the practical difficulties arising because of the enforcement of Rule 8 to the extent of maintaining the rule as a standard of reputability, and infractions of the rule as the basis for disqualifying dental schools from a place upon the list of recommended schools. Discussion of the report consumed the remainder of the session, and the meeting adjourned to meet at 8.30 P.M.

Evening Session.

Dr. DOWSLEY suggested that as Dr. L. C. Bryan, of Basel, Switzerland, was present, he be invited to speak to the association on the subject of his letter, instead of having the letter read; and, on motion of Dr. FINLEY, an invitation was given to Dr. Bryan to address the association, which was carried.

Dr. BRYAN then made an address on the unification of state dental laws, and spoke of the conditions in the republic of Switzerland, which he regarded as somewhat analogous to those existing in the United States with reference to dental legislation. He said, in part, the various cantons or states of Switzerland formerly had their local laws regulating the practice of medicine, midwifery, veterinary surgery, pharmacy, and dentistry, and they were even more unharmonious than those of our states. Up to the time when American dentists came to Switzerland and showed them what dentistry really was, it did not occupy so important a place perhaps as veterinary surgery, and there are, he believes, more veterinary surgeons than dentists even now.

The cantons, having their separate cantonal laws, got into the position about twenty years ago that the United States is at the present time with its diversified dental laws. At that time cantons which had a good standard of examination and dental instruction formed what they called a concordat, or an agreement among four or five of the twenty odd cantons. They agreed that when a dental candidate had passed an examination in one of the cantons where the standard was recognized by the others of the concordat, he would be allowed to practice in any of the five cantons which united formed the concordat. Eight or ten years ago a National Dental Association was formed for the purpose of equalizing the dental laws of the cantons, and overcoming the difficulties that are being experienced in the United States at this time. The dentists decided, through their representatives assembled in a national dental society, to ask the general government to appoint examiners in the five cities where universities existed. All of the state or cantonal boards were to be supervised by a committee appointed by the head of a general government. They put this into the hands of the general government through their representatives in Congress, which is the national assembly there, and the law governing the practice of medicine and its allied specialties was formulated by the medical and dental fraternities assembled in consultation.

This law was passed by the Swiss Congress creating a medical council, which was to have charge of the formulation of the law to be recommended to the various cantons. The result was one commissioner or supervisor was appointed by the general government in the five university towns, and, though in co-operation with other examiners appointed in their cantons or states by the cantonal authorities, held examinations annually for Switzerland at the university towns by cantonal examining boards and with a federal supervisor. When the candidate has passed this federal examination, conducted entirely by the members of the local state or cantonal governments in the university towns where the examinations are held, he receives a federal diploma. The representatives of the different cantons assembled in congress have agreed that each canton shall accept the federal diploma as the highest result of dental education, and accept it in each canton. The cantons, which are as jealous of their state rights as any state in this Union, have the right to regulate their laws so as to allow any of their own citizens, under any regulations that they choose to pass, to practice in their own canton. Therefore, a man who wishes to practice, after he has gone through a dental college there, or through a university, or in any other way fulfilled the requirements of the dental laws, comes up for a state examination very similar to the state board examination; the only difference being that the general government has a representative on the board, and thus the successful candidate secures a federal diploma and not a state or cantonal permit to practice.

It seemed to him a very easy matter for the societies here to unite, and through a committee represent to Congress the necessity for the passage of such a law as will regulate this matter, and you may get some points from this organization which exists in Switzerland. However that may be, it seems that the only outlook from all this difficulty, in regard to the conflicting interests in state laws regulating examinations, is to be secured through some form of acknowledgment by the general government supervision over the examinations or government co-operation.

He advocated this national diploma on the ground that if American dentists expect to obtain any recognition in Europe, if we are to demand from the European governments recognition of an American degree, we must first be able to say to them, "The degree which is presented to you by this candidate is accepted in every state in the Union, and is a federal diploma with the seal of the United States." And until you give a man in the United States a diploma that will be accepted by every state in the Union, you cannot expect reciprocity in Europe. Your candidate, no matter what college he graduates from, or what state board he has passed, no matter how high the requirements are, who goes to a foreign country and applies for permission to practice there and who cannot say, "I am entitled to practice in any state in the Union," cannot expect any reciprocity from any of those foreign countries. Therefore, he appealed to the association to do something in revision of the national laws which will give a man a diploma which he can present with pride to a foreign country. Then you can say to your ministers representing the United States in foreign lands, "This gentleman has received a diploma from the United States of America, and we are back of it; and you must do all you can to protect him, and to secure recognition for him in these foreign countries."

In Germany dentistry is both a profession and a trade. There is a Gewerbe Freiheit; that is, the right to work at trades which the man who has not passed the regular state examination takes advantage of and is allowed to practice under any name he chooses except zahnarzt; that is an ingrounded principle in the arrangement of the government and its laws which allows any man to practice dentistry, as a mechanic, or as a dentist. But if he wants to call himself "doctor" he must pass an examination for zahnarzt. But he may practice as an "American dentist" as a dental mechanic, a zahnkunztler; or he may call himself anything but "doctor," which will explain his acquirements. If he calls himself an American dentist he must be very careful to spell Amerika with a k; those little police regulations are very strictly enforced.

In Switzerland and all other European countries it is very different; there is no such provision to allow a man to practice dentistry. In order to do so he must be an authorized dentist, and have passed the state examination there or made his entire studies there.

This national diploma scheme seemed to him the most important thing before this body,—certainly the most important suggestion that he could offer. He had the details of that law carefully worked out, and was ready to offer the committee any suggestions and propositions and any advice he could give. His great hope and ambition was to see America present its candidates with a federal diploma which will entitle them to practice the world over.

A general discussion of the subject of Dr. Bryan's address followed. In answer to a question by the president as to who fixed the standard of the federal examination, Dr. Bryan replied that the standard is fixed by law of Congress. He further stated, with regard to the examinations by the dental colleges in Switzerland, that they are not as definite or as important as the dental college examinations in this country. "The successful candidate gets certificates of having complied with certain requirements of the government examination, and these certificates allow him to come up for his final examination. . . .

"The law requires that the candidate must have attended certain lectures and have had certain preliminary studies before taking an examination before the state board." In reply to Dr. Donnally's question as to whether it was the regular college course that is prescribed by law, Dr. Bryan replied, "Yes, it is prescribed by law."

Dr. DONNALLY felt that it would be impossible to apply any such scheme as that outlined by Dr. Bryan to the conditions that obtain in this country. There never yet has been recommended to the states by Congress or by federal authority a particular law. The National Bar Association has sought to obtain the unification of state laws on the subject of marriage and divorce, and, notwithstanding the ability of the distinguished members of their committee, they have almost altogether abandoned the idea of national legislation on that subject.

Our committee has thought of procuring the passage by Congress of a law, and have a bill now pending, with pretty good assurances that we could get it passed, but if the law could be passed in the various states first it would have a far better opportunity of passing Congress.

Dr. BRYAN felt that the present conditions in America offered little encouragement, for the reason that it did not seem to be in the mind of any one that the general government could suggest the law to an individual state. He felt, however, that there might be points worthy of consideration in the plan being developed in Switzerland, and he therefore offered to work out the details of the scheme as it now stands in Switzerland, with any suggestions that might subsequently occur to him, which he hoped might be of use to the committee in some way, if not as helping toward securing the much-desired federal diploma, then at least a unification of the state laws.

A vote of thanks was tendered to Dr. Bryan for his address.

Drs. JENKINS (Missouri) and OLIVER (Indiana) called attention to the practical operation of the dental law in the states represented by them, especially with reference to the practical character of the state board examinations.

Dr. OLIVER called attention to the new law of Indiana, Section 22 of which provided that the board may adopt reciprocal relations with other states as it may deem expedient.

The meeting then adjourned till the following day.

(To be continued.)

SOUTHERN CALIFORNIA DENTAL ASSOCIATION.

THE second annual meeting of the Southern California Dental Association was held in Los Angeles, on October 3 and 4, 1899, in the college building of the Dental Department of the University of Southern California.

The session was called to order at 9 A.M., with President W. A. Smith, of Los Angeles, in the chair.

After prayer by Dr. R. W. Morris, of Los Angeles, the president read his annual address. Papers were read and discussed as follows:

"The True Position of our Profession." Dr. H. Gale Atwater, Downey, Cal. Discussion opened by Dr. F. M. Parker, Los Angeles.

"The Electric Root-Drier as a Sterilizer of Pulpless Teeth, and Lactate of Silver in the Treatment of Alveolar Abscess." Dr. W. H. Moore, Santa Barbara. Discussion opened by Dr. A. H. Palmer, Pasadena.

"Educational Work." Dr. J. D. Moody, Los Angeles. Discussion opened by Dr. Evangeline Jordan, Los Angeles.

"Popular Dental Education." Dr. G. A. Millard, Oxnard. Discussion opened by Dr. R. W. Morris, Los Angeles.

"The Potency of Favorite Dental Antiseptics." Dr. Edgar Palmer, Los Angeles. Discussion opened by Dr. W. C. Smith, Pasadena.

The following officers were elected for the following year: H. R. Harbison, D.D.S., San Diego, president; L. N. Bedford, D.D.S., Redlands, vice-president; Emma T. Read, D.D.S., San Diego, second vice-president; L. E. Ford, D.D.S., Los Angeles, secretary; Dr. J. M. White, Los Angeles, treasurer.

The afternoon sessions were devoted to clinics.

On Tuesday evening there was a banquet, followed by a theater party.

During the meeting a committee of three members was appointed, consisting of Drs. R. W. Morris, W. H. Moore, and G. A. Millard, to confer with the boards of education of the different counties in regard to having this association appoint dentists to make an annual examination of children's mouths between the ages of six and ten years; they to be furnished with one diagram, so that their parents might know in what condition their mouths were at this important period, and another diagram to be kept for statistical purposes.

Another committee was appointed, consisting of three members, Drs. H. Gale Atwater, F. M. Parker, and L. E. Ford, to unite with other associations and societies throughout the country in securing the appointment of dentists in the army.

A legislative committee of five members was appointed, consisting of Drs. F. R. Cunningham, W. M. Garnett, F. M. Parker, A. H. Palmer, of Pasadena, and R. F. Phillips, of San Diego.

This was the largest and most enthusiastic meeting ever held in Southern California, forty new applications being received for membership. The association now consists of ninety active members and one honorary member.

The next meeting will be held in October, 1900, at Santa Barbara.

L. E. FORD, *Sec'y.*

NORTHEASTERN DENTAL ASSOCIATION.

THE annual meeting of the Northeastern Dental Association was held in Holyoke, Mass., October 18 and 19, 1899. About two hundred and fifty members and visitors were present, every New England state being represented. Dr. B. Holly Smith, president of the National Dental Association, and Drs. D. D. Smith and S. H. Guilford, of Philadelphia, were present as guests of the association, and each read excellent papers. The officers elected for the ensuing year were as follows: Waldo E. Boardman, Boston, president; Andrew J. Flanagan, Springfield, Mass., and George A. Lowe, Rockport, Mass., vice-presidents; Edgar O. Kinsman, Cambridge, Mass., secretary; Fred. N. Wetherbee, Milford, N. H., assistant secretary; J. Tenney Barker, Wallingford, Conn., treasurer; Frederick T. Murlless, Jr., Windsor Locks, Conn., librarian; Charles McManus, Hartford, Conn., editor.

EDGAR O. KINSMAN, *Secretary.*

FOURTH DISTRICT DENTAL SOCIETY.

AT the annual meeting of the Fourth District Dental Society of the State of New York, at Schenectady, October 17, 1899, the following officers were elected for the ensuing year: W. E. Snyder, Amsterdam, president; A. D. Youngs, Johnstown, vice-president;

E. Doolittle, Saratoga, treasurer; O. J. Gross, Schenectady, secretary.

The next meeting will be held in Schenectady the third Tuesday of April, 1900.

O. J. GROSS, *Secretary.*

SOUTHWESTERN IOWA DENTAL ASSOCIATION.

THE annual meeting of this association was held at Corning, Iowa, on October 17, 1899. Following are the officers elected for the ensuing year: C. H. Hoover, Albia, president; J. A. Ross, Osceola, vice-president; F. P. Wells, Clarinda, secretary; G. E. King, Villisca, treasurer.

The association will meet next year at Villisca.

NORTHERN ILLINOIS DENTAL SOCIETY.

THE Northern Illinois Dental Society held its regular annual meeting October 18 and 19, 1899. There was a good attendance, and it was an interesting meeting. The following officers were elected for the next year: O. A. Chappell, Elgin, president; J. W. Stephens, Dixon, vice-president; J. J. Reed, Rockford, secretary; M. R. Harned, Rockford, treasurer; F. T. Bell, Aurora, member of the Executive Committee.

Aurora was selected as the next place of meeting.

J. J. REED, *Secretary.*

SAN FRANCISCO DENTAL ASSOCIATION.

THIS association meets regularly on the second Monday of each month, the annual election of officers being held at the October meeting. Following are the officers for the ensuing year: H. L. Seager, president; W. Z. King, vice-president; W. A. Knowles, treasurer; C. Deichmiller, recording secretary; Miss M. V. Croall, corresponding secretary; A. L. Taylor, librarian.

All reputable practitioners in San Francisco and vicinity are invited to become members.

C. DEICHMILLER, *Rec. Sec'y.*,
Y. M. C. A. Bldg., San Francisco, Cal.

DENTAL SOCIETY ANNOUNCEMENTS.

OHIO STATE DENTAL SOCIETY.

THE thirty-fourth annual meeting of the Ohio State Dental Society will be held at Columbus, Ohio, December 5, 6, 7, 1899, at the Great Southern Hotel. All are cordially invited.

S. D. RUGGLES, *Secretary,*
Portsmouth, Ohio.

NATIONAL SCHOOL OF DENTAL TECHNICS.

The annual meeting of the National School of Dental Technics will be held in Philadelphia, at the Continental Hotel, beginning 10 A.M., Wednesday, December 27, 1899, and continuing three days.

Every teacher in the profession should be present. A most excellent program will be presented, consisting of a lecture and demonstration by Professor J. Liberty Tadd, and papers by Drs. Faneuil D. Weisse, C. S. Case, D. A. Gritman, A. E. Webster, W. H. Whitslar, M. H. Cryer, H. J. Goslee, Otto Arnold, I. N. Broomell, G. V. Black, A. H. Thompson, James Truman, and others.
GEO. H. WILSON, *Secretary.*

OREGON STATE DENTAL SOCIETY.

The annual meeting of the Oregon State Dental Society will be held in Portland, beginning December 13, 1899. The profession of the state and northwest are invited to co-operate and make this meeting a record-breaker in the history of the profession in Oregon.

The officers are Drs. John Welch, president; R. L. Lincoln, E. M. Hurd, vice-presidents; Arthur W. Chance, secretary; C. E. Stalte, treasurer.

JOHN WELCH, Chairman,
HERBERT C. MILLER,
Committee of Arrangements.

CLINIC OF FIRST DISTRICT DENTAL SOCIETY.

The First District Dental Society of New York will hold a clinic at the New York Dental School, 216 W. Forty-second street, on December 12, 1899, to which all dentists are cordially invited.

S. L. GOLDSMITH,
For the Committee.

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EDITORIAL.

THE CENSUS CLASSIFICATION OF DENTISTS.

As preparations are now actively in progress for the taking of the twelfth census of the United States in 1900, we deem it expedient to direct the attention of our readers to a difficulty experienced by the dental profession about the time of the taking of the previous census, in 1890. Much annoyance was caused at that time by the classification of dentists as manufacturers by the then Superintendent of the Census, Hon. Robert P. Porter, whose authority for such classification grew out of his interpretation of the clause relating to "productive industries" in House Bill No. 7696, commonly known as the Willcox bill. Those who were then in practice are familiar with the movement which eventuated in the exemption of dentists from the provisions of the Willcox bill.

The protest against the injustice of this classification originated in Baltimore, in which city members of the dental profession had already been called upon to fill out the blanks demanding statistical information relative to the amount of work done in their offices, the income therefrom derived, and other like information. In a number of instances this information was given without protest, for the reason that it was deemed by many that any protest would be without avail. However, under the initiative of Dr. Richard Grady, a movement was started in Baltimore which rapidly spread throughout the country. An accredited committee representing the interests of the dental profession in this country obtained an audience with the Senate Committee having the Willcox bill in charge, and the following, suggested by Dr. Alonzo Boice, as an amendment, was submitted: "*Provided,* that nothing in this act shall be construed as authority to collect statistics from professional men such as lawyers, physicians, and dentists, of the products for their individual clients or patients."

After hearing the testimony of the committee, the Superintendent of Census, in conjunction with the Senate Committee, declined to accept the amendment, as it would delay the passage of the Willcox bill, but in lieu thereof agreed in writing as follows with the dental committee: "The Superintendent of the Census agrees with representatives of the dental associations present at a meeting of the Senate Committee on the Census to carry out the spirit and purpose of the amendment presented by the said associations at the meeting, and which appears in the paper marked 'A' hereto attached. (Signed) Robert P. Porter."

The agreement signed by the Superintendent of the Census in 1890 had the effect desired, and in the DENTAL COSMOS for 1892, page 669, the result was editorially commented upon as follows: "This agreement practically restores the classification of 1880, provided it can be maintained. We regret that the agitation was not begun earlier, so that the bill would be amended to carry the exemption, as it is not clear to us that dentists are technically freed by this agreement. However, as it appears to be the only resource under the circumstances, we shall hope that the justice of the position it concedes will preserve it against any possible assault."

We are not at this writing in possession of sufficiently full or accurate information to enable us to report upon the status of this question with respect to the coming census. We call attention to it now because of the importance of the fundamental principle involved, and in order that, if necessary, active steps may be taken to prevent a repetition of the defect in the previous census law, which so nearly resulted disastrously to the American dental profession.

The full significance of the situation was scarcely realized until the danger was imminent, and, when it was successfully passed, was early forgotten. Let us see to it, then, that no like error arises in future, and take steps immediately to avoid a national degradation of our calling, such as would have occurred but for the timely action of those who prevented the catastrophe in 1890.

THE HORACE WELLS MEMORIAL.

At the thirty-fourth annual meeting of the American Dental Association, held at Old Point Comfort in August, 1894, a resolution was introduced by Dr. J. D. Thomas, of Philadelphia, for the appointment of a committee of nine to take into consideration and report at the same meeting measures for the proper celebration in December, 1894, of the fiftieth anniversary of the discovery of anesthesia by Horace Wells. The committee subsequently reported their plan, which included the holding of a memorial meeting in Philadelphia, at which two papers were to be read: one upon the "Application of Anesthesia to Surgery and its Benefits to Mankind." by Dr. James E. Garretson, of Philadelphia, Pa., and the other upon the "History of Anesthesia," by Dr. Thomas Fillebrown, of Boston, Mass.

On December 11, 1894, the day of the fiftieth anniversary of the discovery of anesthesia by Horace Wells, the memorial meeting pursuant to the resolution of the American Dental Association and under its auspices was held. It was a notable gathering of distinguished representatives of the dental profession, and a full account of the proceedings was published in the Dental Cosmos for January, 1895.

At the close of the meeting Dr. Robert Huey, of Philadelphia, moved that a committee be appointed to take in hand the matter of the erection of a permanent memorial to Horace Wells in Washington, D. C.

The frontispiece to this issue is a reproduction from a photograph of the bronze bust of Horace Wells, which is the form that the permanent memorial finally took in the minds of the committee.

The bust is the work of the sculptor, J. Scott Hartley, of New York, and is pronounced by members of the family and competent critics to be an excellent likeness of Dr. Wells.

The cost of the bust and pedestal, amounting to about one thousand dollars, has been met by contributions from members of the dental profession in America.

By the time this issue reaches our readers the memorial will doubtless be in place in the library of the Army and Navy Medical Museum at Washington, D. C., its permanent depository.

DR. B. H. CATCHING.

OUR readers will be pained to learn of the death of Dr. B. H. Catching, of Atlanta, Georgia, which occurred suddenly on November 23. An extended notice will appear in our next issue.

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BIBLIOGRAPHICAL.

CURSUS DER ZAHNHEILKUNDE. Ein Hülfsbuch für Studierende und Zahnärzte. Von Dr. Med. CONRAD COHN. Berlin, Fischer's Medicin Buchhandlung, 1900. Price, Mk. 13.50.

This is the second edition of a manual dealing with the main essentials of the dental curriculum as pursued in Germany.

The work is divided into ten sections or parts, dealing with the following subjects: Histology; anatomy of the head, teeth, and jaws; comparative anatomy; embryological development of the mouth, jaws, and teeth; physiology; general pathological anatomy; bacteriology; materia medica; general surgery; diseases of the mouth and teeth. The work was the outgrowth of a need experienced by the author in preparing students for professional work, and is admirably adapted to the purpose so far as it covers the ground. The text is full and explicit, and its teachings trustworthy. Had the author included the technical phase of the subject so as to cover the art side of the dental curriculum in the same efficient manner, it would have greatly enhanced the value of the work as a help to students.

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OBITUARY.

DR. JAS. W. KESLER.

DIED, suddenly, October 10, 1899, at his residence in Honesdale, Pa., Dr. JAS. W. KESLER, of apoplexy.

Dr. Kesler was born in Wilkes-Barre, Pa., December 25, 1842. He received his education in the public schools, and was a graduate of Wyoming Seminary. After qualifying himself for the profession of dentistry he practiced at Howley and at Pittston, Pa. At the opening of the civil war he entered the

United States Navy, and served on board the "Mississippi," of which vessel Lieutenant (now Admiral) Dewey was at that time executive officer, and the latter selected young Kesler as his clerk. On the night of March 14, 1863, the fleet of ten ships attempted to run past the batteries of Port Hudson, on the Mississippi river, but only two succeeded,—viz, the "Hartford," Farragut's flagship, and the "Albatross," the two vessels being lashed together. The "Mississippi" ran aground opposite the principal battery, and all efforts to float her were futile. It was decided to set her on fire and abandon her, and the crew were hurriedly ordered into the boats. In the haste and confusion which followed some were left on board, among them young Kesler, who had been stationed at the forward magazine below the batteries. Finding himself, on reaching the deck, almost alone, with shot and shell flying thick around him, he sprang into the river, and after swimming about a mile, with the enemy's shot plowing the water around him, he reached the western shore unharmed. He remained in the naval service until October 10, 1864, when, his health failing, he was honorably discharged, and returned to his home in Wilkes-Barre.

In 1865 he opened a dental office in Honesdale, in which city he thenceforward continued the practice of his profession for the greater part of the time till his death. On June 23, 1890, President Harrison appointed him consular agent at Ostend, Belgium.

Dr. Kesler was prominent in Grand Army and Masonic circles, and was also a member of the United States Naval Veterans' Association. He was a frequent contributor to the press, a number of articles from his pen on the subject of naval operations during the civil war having appeared in various magazines. He possessed an active mind, a ready sense of humor, unfailing cheerfulness, and other admirable personal qualities which gained for him hosts of friends. A widow and one daughter survive him.

DR. E. G. HAZELTON.

DIED, October 22, 1899, at his home, Kenosha, Wis., Dr. E. G. HAZELTON, from typhoid fever.

Born in Fowler, St. Lawrence county, N. Y., in 1844, Dr. Hazelton's dental pupilage was passed with Dr. E. A. Holbrook, of Watertown, N. Y., from 1863 to 1865. He entered upon independent practice in Waukesha, Wis., in 1866, but in 1868 he removed to Kenosha. Here, during the more than thirty years which have elapsed, he has been a prominent figure in the higher social and business circles of the city. The Kenosha *Daily Gazette* says of him: "The deceased had seen much of the growth and prosperity of our city, and for years was a moving active spirit in all that pertained to the general welfare of Kenosha. He was the organizer of the first water system in use in Kenosha, being the principal stockholder and manager of the company for many years. For five years past he had borne much of the brunt of the failure of the Dan Head & Co. bank, and to this and the worry attendant is ascribed the breaking down of a once vigorous system. Through it all he labored zealously to save depositors and if possible retain their confidence. The work was great and it told on him, and when disease took hold of him it found his system weak from the toil he had given to the work that he had undertaken for the good of his fellow-man and his own good name."

Dr. Hazelton was married July 10, 1873, at Waukegan, Ill., to Miss Evelyn Price, who, with one daughter, survives him.

PUBLISHER'S NOTICE.

THE DENTAL COSMOS FOR 1899. A GREAT VOLUME.

WITH the present issue the DENTAL COSMOS completes its forty-first volume.

This volume has been in many respects notable. It has presented over thirteen hundred pages of printed matter, every line of it dental, and a great part of it of vital interest to every practitioner of dentistry. This text has been vivified by nearly three hundred illustrations. The subjects considered have covered almost every department of dentistry. Many of these have been so presented that practical questions—questions regarding what was proper and what improper practice—have been brought visibly nearer final solution and definite determination.

Take the treatment of irregularities, for instance. There have been some half-dozen papers on this subject, every one of them a valuable contribution to the general fund of information, and any one of them well worth the year's subscription to the dentist interested in this department of practice,—as who is not? We venture the statement that few have read these papers who have not thereby added to their knowledge of proper methods of regulating malposed teeth.

And so of many other departments of practice. The proper shaping and filling of cavities for the best results have been carefully studied and exploited. The management of children's teeth, the treatment of root-canals and of pyorrhea alveolaris, crown- and bridge-work, are subjects of perennial interest, with continually expanding limitations, which have been illuminated and clarified by the light shed upon them during the year. Combinations of filling-materials, as cement and amalgam, gutta-percha and amalgam, have been practically treated and their value demonstrated. The knowledge of porcelain inlays, of cataphoresis, and of the X rays in dentistry has been considerably increased. These are but a few examples from this ever-new, up-to-date library of dental information, which the annual index, with its thousands of references, makes readily available to the searcher after knowledge.

The great majority of subscriptions for the DENTAL COSMOS expire with this issue. As a notification to the subscriber we place within the front cover of each expiring subscription a bill for the next volume. This bill is *not* charged up to the subscriber; it is simply a notice to him that the time for which he has paid has ended, and that it is time to renew.

We shall be obliged if our friends will send in their renewals promptly.

Subscriptions may be made direct, through any of our houses, or through the local dealer.

Subscription price, to United States, Canada, and Mexico, $2.50 a year in advance; to other U. P. U. countries, $3.00 a year in advance. Half a year, half price.

THE S. S. WHITE DENTAL MFG. CO.

PERISCOPE.

Cobalt Nitrate as an Antidote to Cyanide.—Mr. A. Wauchope, of the Woodside Cyanide Works, South Australia, states that three years ago he gave a rabbit a solution of potassium cyanide, and in a few minutes the rabbit was apparently dead. Then he forced a solution of cobalt nitrate down the rabbit's throat, plunged it into cold water, and breathed into its nostrils. After the lapse of one minute the muscles showed signs of returning animation, and in ten minutes the rabbit attempted to run away, which it ultimately did. Mr. Wauchope has never had the chance of trying it on man, but is sure of its good effects. An excess of the nitrate is necessary.—*Chemist and Druggist.*

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HINTS, QUERIES, AND COMMENTS.

"Brittle Pins" in Teeth.—The platinum pins of porcelain teeth sometimes break in apparently unaccountable ways during laboratory operations. The unaccountable part, to the dentist, is the character of the fracture, which is crystalline, instead of fibrous, as would be expected from the known character of the metal. This engenders, naturally enough, a suspicion that the platinum in the pin is not pure. Messrs. Baker & Co., the well-known platinum workers, of Newark, N. J., issue a small pamphlet, "Notes upon the Use and Care of Platinum Ware," which contains a number of important hints upon the subject. The following extract from the sixth edition deals with conditions, some of which may readily obtain in the dental laboratory, the presence of which would account for the occasional breakage of pins referred to:

"It is important to remember that, although platinum is not oxidized in the air at any temperature, nor attacked by any single acid, yet there are many substances that attack and combine with it at comparatively low temperatures.

"The caustic alkalies, the alkaline earths, nitrates and cyanides, and especially the hydrates of barium and lithium, attack platinum at a red heat, although the alkaline carbonates have no effect at the highest temperatures. Sulfur, in the absence of alkalies, has no action, but phosphorus and arsenic attack platinum when heated with it.

"Direct contact of platinum with burning charcoal should be avoided, since the silicon reduced from the charcoal ash unites with platinum, making it brittle and liable to fracture.

"Also contact with compounds of the easily reducible metals is especially dangerous at high temperatures, as alloys with platinum having a low fusing point are readily formed. This is especially true of lead.

"Heating of platinum with spirit lamps is preferable to the use of ordinary gas. When gas is used care should be taken to have the supply of air sufficient to insure complete combustion, since, with a flame containing free carbon, the platinum suffers deterioration by the formation of a carbide of platinum, which, oxidizing later, blisters the metal. For this reason, also, the inner cone or reducing flame should not be in contact with the metal.

"The loosening effect of the Bunsen flame upon the surface of platinum exposed to its action produces the familiar gray appearance which cannot be removed except by burnishing. Platinum triangles often become gray and very brittle from the same cause. Systematic application of moist sand to all articles affected in this way, after use, will keep them in prime condition and materially prolong their life, with but a trifling loss in weight."

A MONTHLY BIBLIOGRAPHY OF DENTAL LITERATURE.

COMPILED BY J. MELVIN LAMB, M.D., D.D.S., WASHINGTON, D. C.

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◆

LIST OF UNITED STATES PATENTS

PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING OCTOBER, 1899.

October 3.—No. 634,083, to Aaron P. Gould. Head-rest.
" " No. 634,084, to Aaron P. Gould. Dental chair.
" *10.*—No. 634,638, to Walter I. Brigham. Attachment for dental mirrors.
" " No. 634,731, to James W. Ivory. Tooth clamp.
" " No. 634,732, to James W. Ivory. Fastener for dental instruments.
" *17.*—No. 634,906, to Henry G. McCloskey. Tooth-brush.
" " No. 635,135, to Irad Hawley. Tooth-powder box.
" " No. 635,244, to John A. Gholson. Dental tool guard.
" *31.*—No. 635,773, to Harry F. Hamilton. Tooth crown.
" " No. 635,893, to Walter A. Inglehart. Dental plugger.
" " No. 636,090, to Edwin R. Waterman and Robert R. Morison. Air heater.
" " No. 636,091, to Edwin R. Waterman and Robert R. Morison. Fluid heating apparatus.

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THE S. S. WHITE DENTAL MFG. CO.

Please send me the **Dental Cosmos** *for 1900, for which find inclosed*……………………………………

Name……………………………………

Street No.……………………………………

Post Office……………………………………

County……………………………………

State……………………………………

THE S. S. WHITE

New Treadle-Rheostat Outfits,

WITH

SPECIAL DENTAL MOTORS.

FOR USE WITH AND WITHOUT TRANSFORMER.

Patented August 15, 1893, and July 24, 1894.

Efficiency and durability at an economical price are the chief factor in the popularity of the Treadle-Rheostat Outfits. The economical price, as compared with the Motor Stand Outfits, became possible, in the first instance, through the combination of the Rheostat with the Treadle, so that they could be mounted in one case. The reduced prices at which these Outfits are now sold put the full enjoyment of the advantage of electricity within the reach of any practicing dentist to whom a 110-volt or 220-volt constant current is available. As to their durability, many of them have now been in active service over four years, without failing or showing signs of giving out.

THE TREADLE-RHEOSTAT

is the key to these Outfits. It consists of a Carpenter Enamel Rheostat and a pedal-controlling switch, both mounted in one case. This case is easily moved on the floor and placed in position convenient to the chair. The pedal lever swings to right and left of the center. Pushing it to the right starts the motor forward; to the left starts it backward. The farther from the center it is moved in either direction, the greater the speed. Depressing the lever at any speed instantly stops the motor and tool. When the lever is central, the current is off.

The Rheostat is fire-proof, and has our patent process of wiring, giving practically full power at slow speed.

THERE ARE TWO

general types of the Treadle-Rheostat Outfits, each of which can be rigged in various ways, as shown in pages following.

In the first, Special Dental Motor A is used, with the Transformer. It will operate the electric mallet, hot-air syringe, cautery, mouth-lamp, etc. This motor is spherical in shape, compact, neat, powerful, noiseless, and practically dust-proof. An extra pair of brushes supplies current for the Transformer. With this type practically anything that can be done with the New Model No. 2 Motor Stand Outfit may be done.

In the second, Special Dental Motor B is used. It operates the engine only, and it cannot be changed into the other type except by substituting the Motor A, as Motor B is not supplied with the attachments necessary to run the Transformer. Outfits with Motor B are operated by means of a Wall-Switch.

FURTHER DETAILS.

The electrical part of these Outfits consists of the Treadle-Rheostat with Cable and Contact Plate, the Motor and Connecting Plate, and the Wall-Switch or Transformer and Connecting Cords. The conducting cable has a contact plate which insures proper connection to our Motor.

The Motor is either mounted on our new No. 3 Portable Motor Stand, to which any of our engine-arms and standards can be attached, or furnished on a Tripod which can be placed on a shelf and used to drive a suspension or wall-bracket engine.

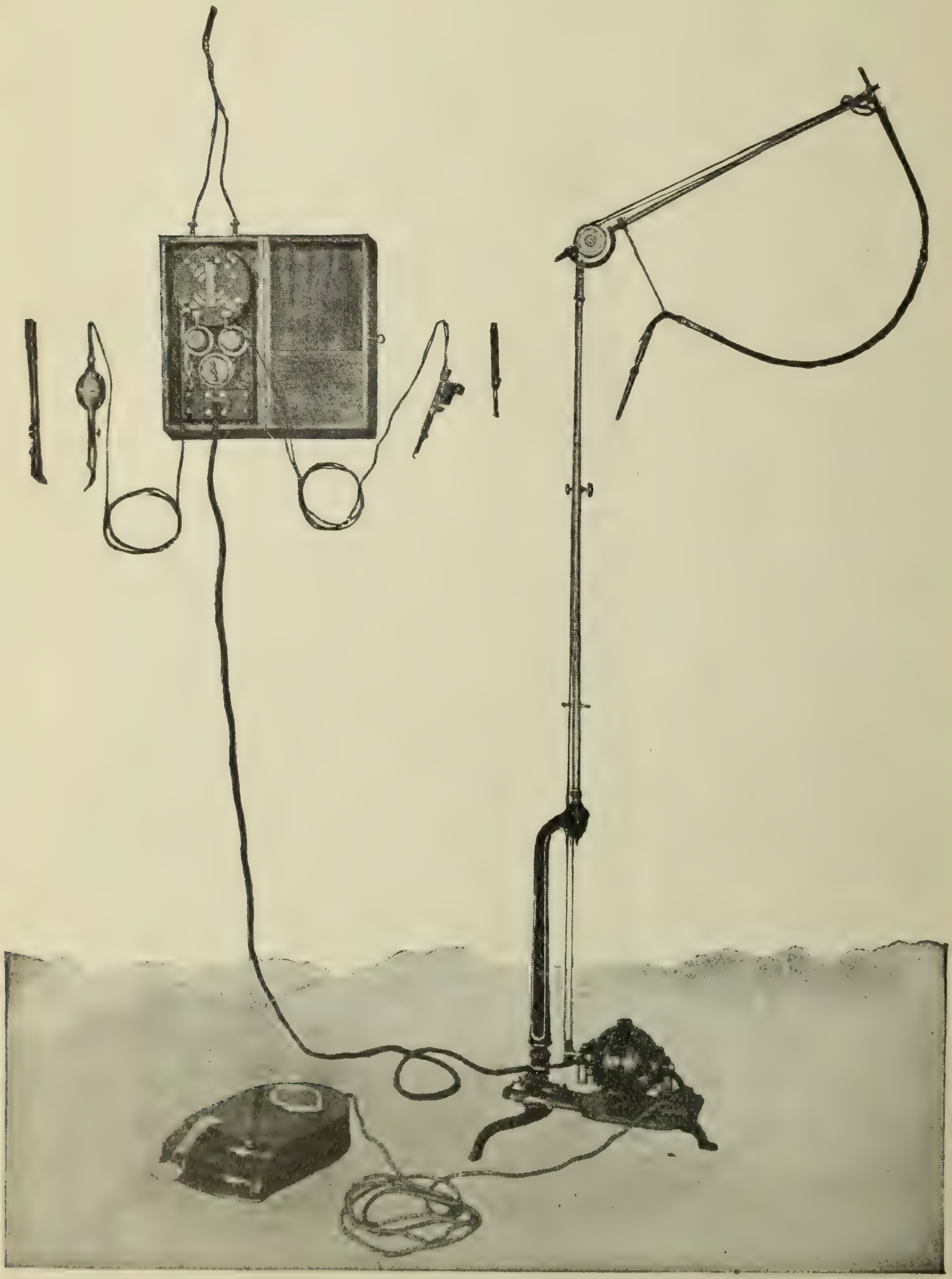
All these Outfits provided with S. S. White flexible arms and hand-pieces can be supplied with slip-joint, permitting mechanical mallets to be readily attached.

The S. S. White New Treadle-Rheostat Outfit.

For 110-Volt Direct Current Circuits.

With Transformer and Special Motor A for operating Engine, Electric Mallet, Mouth-Lamp, Cautery, Hot-Air Syringe, etc.
Weber-Perry Cord Engine, Standard and Upper Arm, S. S. White Engine-Head, Flexible Arm, No. 2 Slip-Joint, Duplex Spring, and No. 7 Hand-Piece.

Patented January 7, 1890; August 15, 1893; July 24, 1894; December 6, 1887.



This Outfit can be furnished with Wall-Switch E in place of Transformer, or with any other S. S. White Hand-piece.

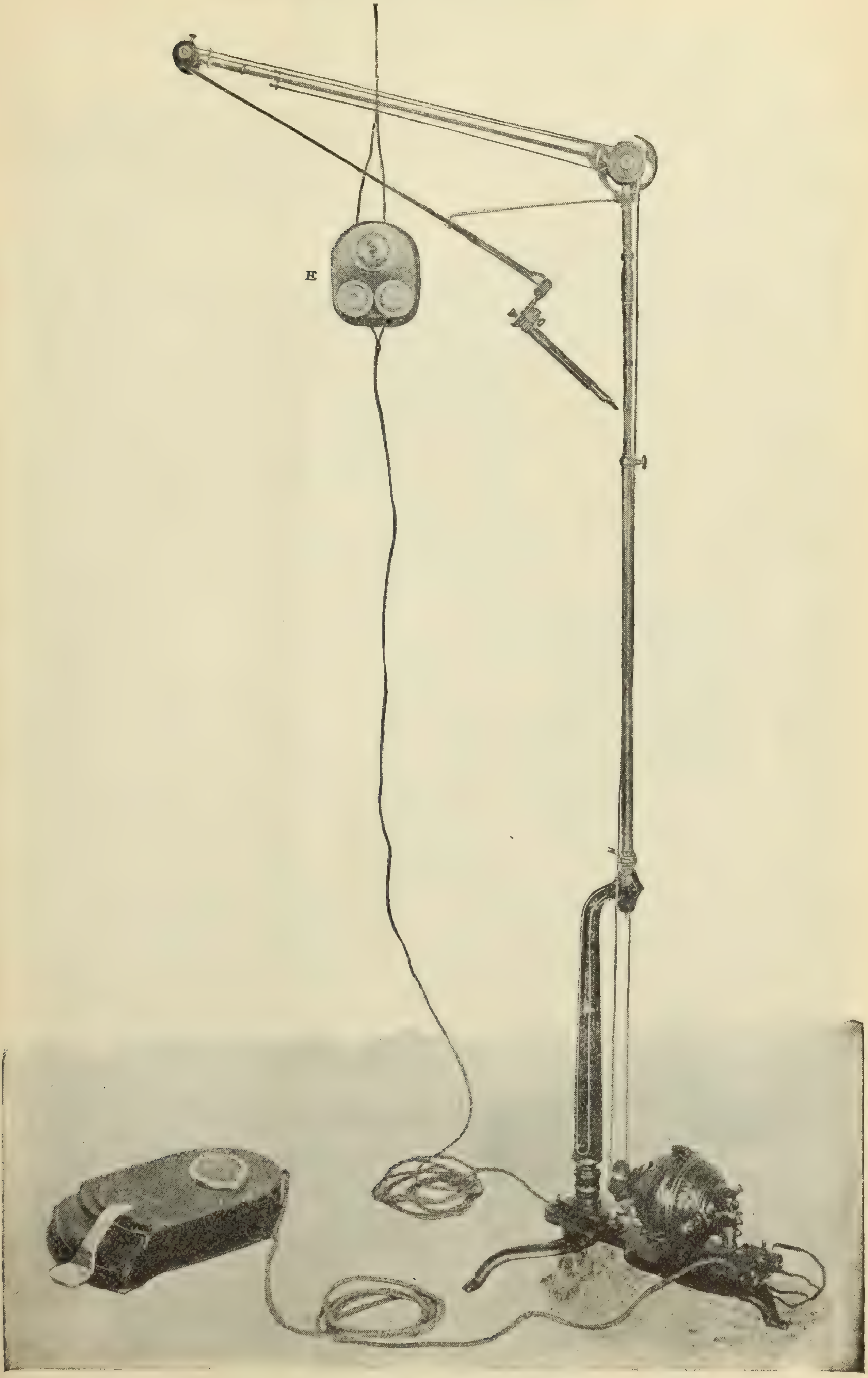
For prices, see page 5.

The S. S. White New Treadle-Rheostat Outfit.

With Wall-Switch E, Special Standard, Doriot Arm, and Hand-Piece A, with A or B Motor.

For 110-Volt Direct Current.

Patented August 15, 1893; August 22, 1893; July 24, 1894.



This Outfit can be supplied with Transformer in place of Wall-Switch E where A Motor is used, and with other Engine Arms and Standards in place of Doriot Arm and Special Standard.

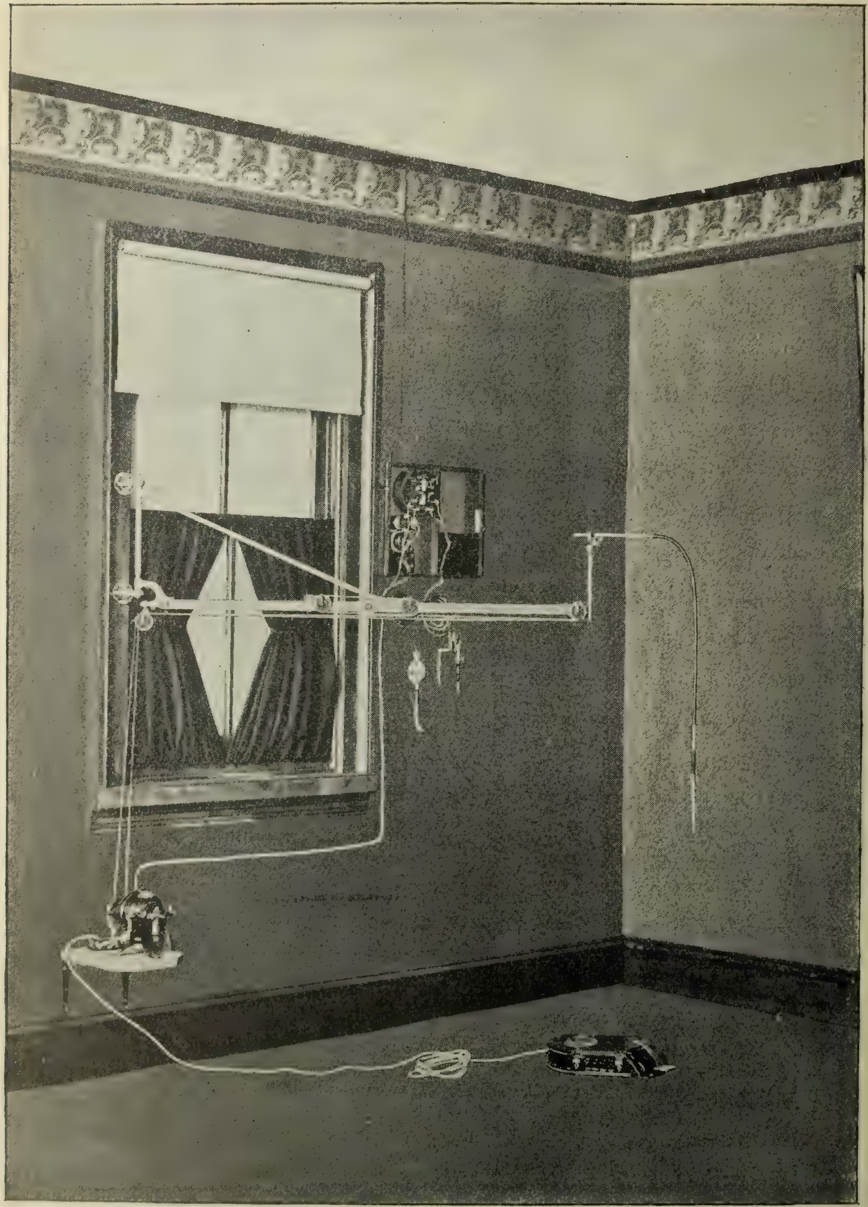
For prices, see page 5.

The S. S. White Treadle-Rheostat Outfit and Transformer.

For 110-Volt Direct Current.

With No. 2 Engine Wall Bracket, S. S. W. Engine-Head, Flexible Arm, No. 2 Slip-Joint, Duplex Spring, and No. 7 Hand-Piece.

Patented July 11, 1893; Aug. 15, 1893; Aug. 22, 1893; July 3, 1894; July 24, 1894



This Outfit can be furnished with Wall-Switch E and B Motor in place of Transformer, or with Doriot, Weber-Perry, or Shaw Arm in place of S. S. W. Arm.

For prices, see page 5.

NEW TREADLE-RHEOSTAT OUTFITS.

For 110-Volt Current, with Special Motors A or B, for use with or without Transformers.

ELECTRICAL OUTFITS ALONE.	With Motor A and Wall-Switch E.	With Motor A and Plain Transformer.*	With Motor B and Wall-Switch E.
Treadle-Rheostat	$37.50	$37.50	$37.50
Special 110-Volt Dental Motor A, with extra brushes, etc.	32.00	32.00	
" " " B, without extra brushes			27.00
Plain Transformer		35.00	
Wall-Switch E	4.50		4.50
No. 3 Motor Stand	6.00	6.00	6.00
Price complete	80.00	110.50	75.00
ELECTRICAL OUTFITS WITH DENTAL ENGINE COMBINATIONS.			
The S. S. White Standard, Pulley-Head, Flexible Arm with Duplex Spring, new Arm Support, and Hand-Piece	29.00	29.00	29.00
Treadle-Rheostat Outfit and No. 3 Motor Stand	80.00	110.50	75.00
	109.00	139.50	104.00
The S. S. White Pulley-Head, Flexible Arm with Duplex Spring, new Arm Support, and Hand-Piece attached to Weber-Perry Engine Standard and Upper Arm	44.25	44.25	44.25
Treadle-Rheostat Outfit and No. 3 Stand	80.00	110.50	75.00
	124.25	154.75	119.25
The new Doriot Engine Arm and Hand-Piece A with Special Standard to attach to No. 3 Stand	48.00	48.00	48.00
Treadle-Rheostat Outfit and No. 3 Stand	80.00	110.50	75.00
	128.00	158.50	123.00
The Weber-Perry Cord Engine and Standard	43.50	43.50	43.50
Treadle-Rheostat Outfit and No. 3 Stand	80.00	110.50	75.00
	123.50	154.00	118.50
The Shaw Engine-Arm, S. S. W. Hand-Piece and Standard	32.00	32.00	32.00
Treadle-Rheostat Outfit and No. 3 Stand	80.00	110.50	75.00
	112.00	142.50	107.00
The Improved S. S. White No. 2 Engine Wall Bracket, with Compensating Pulleys	40.00	40.00	40.00
Doriot Arm and Hand-Piece A	40.00	40.00	40.00
Treadle-Rheostat Outfit without No. 3 Stand but with Tripod	75.50	106.00	70.50
	155.50	186.00	150.50
The Improved S. S. White No. 2 Engine Wall Bracket, with Compensating Pulleys	40.00	40.00	40.00
S. S. White Pulley-Head, Flexible Arm, with Duplex Spring, new Arm Support, and Hand-Piece	25.00	25.00	25.00
Treadle-Rheostat Outfit without No. 3 Stand but with Tripod	75.50	106.00	70.50
	140.50	171.00	135.50
The Elliott Suspension Engine for ceiling, with Improved Hand-Piece	33.00	33.00	33.00
Treadle-Rheostat Outfit without No. 3 Stand but with Tripod	75.50	106.00	70.50
	108.50	139.00	103.50
S. S White Arm with Duplex Spring, new Arm Support, and Hand-Piece for direct connection to Motor	19.25	19.25	19.25
Direct Coupler to connect Arm to Motor	5.00	5.00	5.00
Treadle-Rheostat Outfit without Stand but with Cone Socket	75.50	106.00	70.50
S. S. White Tool Bracket No. 1 to hold Motor	10.00	10.00	10.00
	109.75	140.25	104.75
Counterpoise Engine with No. 6 or 7 Hand-piece	45.00	45.00	45.00
Treadle-Rheostat Outfit without No. 3 Stand but with Tripod for Motor	75.50	106.00	70.50
	120.50	151.00	115.50

Crane for Elliott Suspension Engine, extra	5.00
No. 2 Slip-Joint extra	7.50
Tripod for Motor when used without No. 3 Stand	1.50
Shelf with Iron Brackets for holding Motor	1.50
The S. S. White No 2 Engine Wall Bracket without Compensating Pulleys	35.00

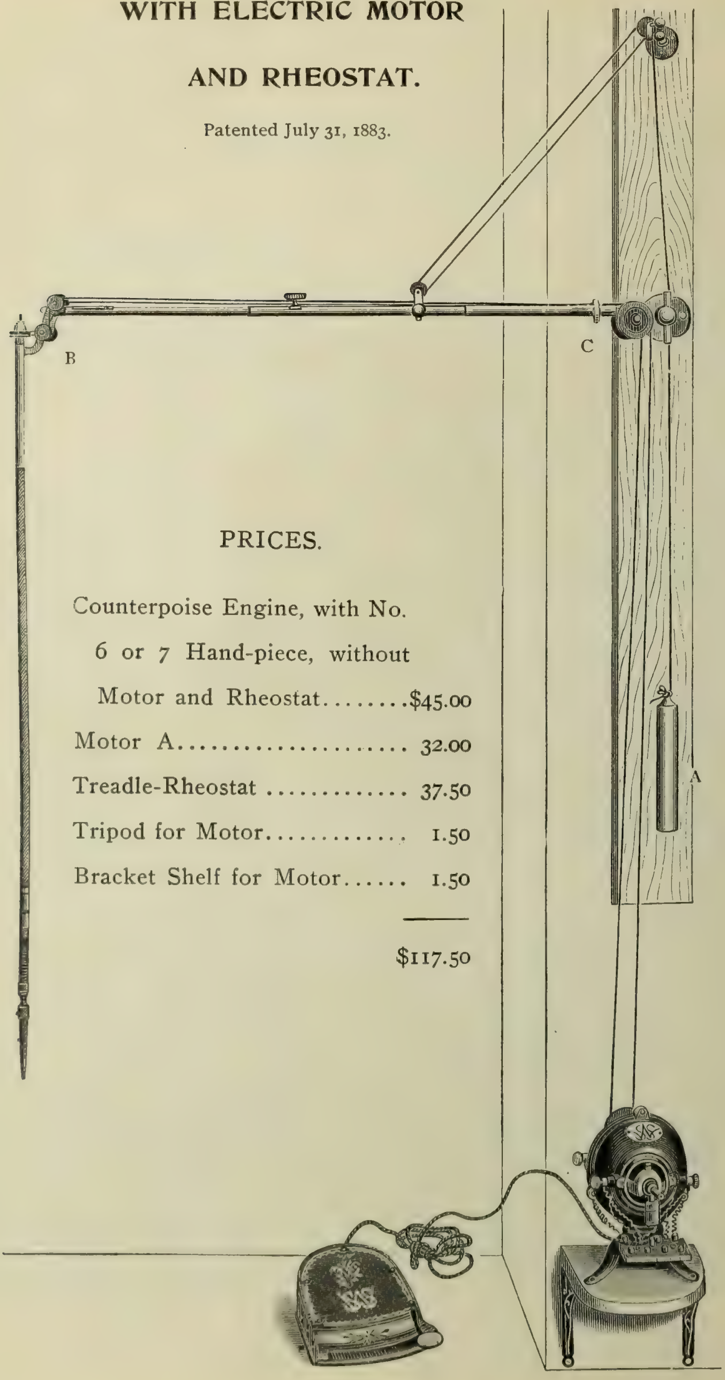
*Transformer with mirror front adds $2 00 to prices of Outfits with plain Transformer.

The S. S. White Flexible Arm, as supplied with these Outfits, includes the Duplex Spring and Flexible Arm Support.

THE COUNTERPOISE DENTAL ENGINE

WITH ELECTRIC MOTOR AND RHEOSTAT.

Patented July 31, 1883.

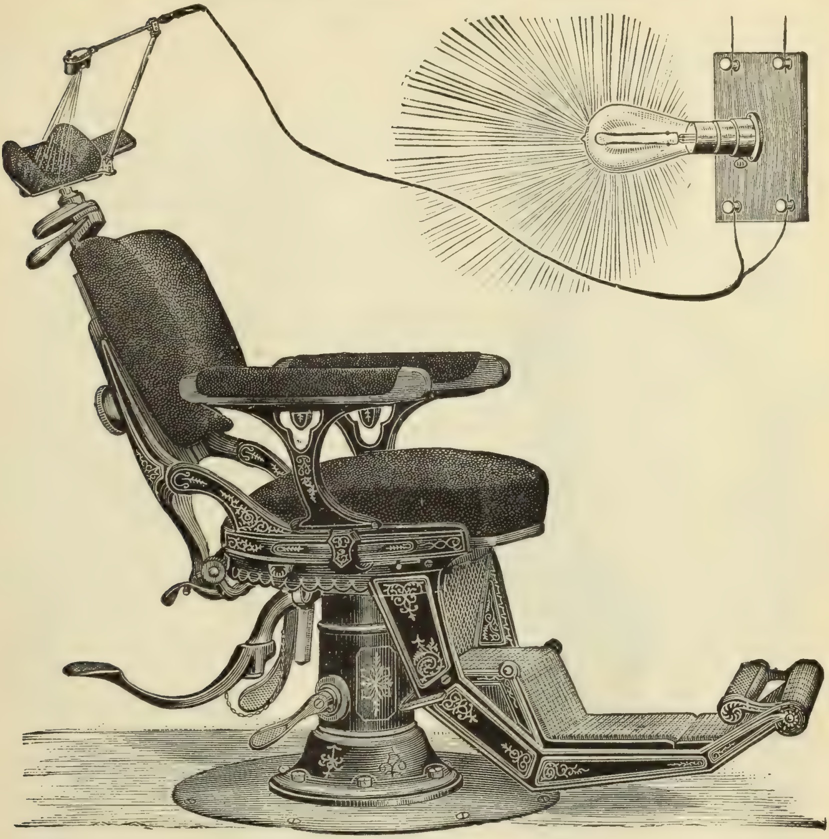


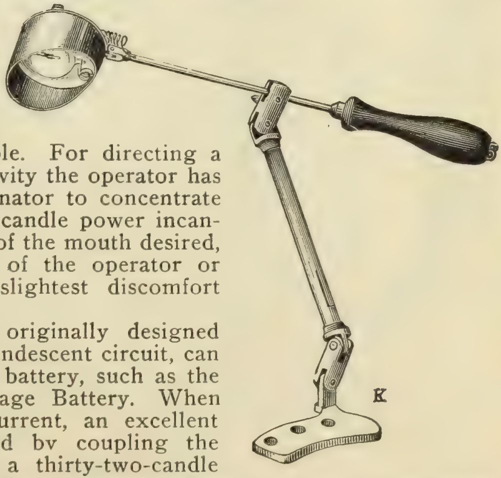
PRICES.

Counterpoise Engine, with No. 6 or 7 Hand-piece, without Motor and Rheostat	$45.00
Motor A	32.00
Treadle-Rheostat	37.50
Tripod for Motor	1.50
Bracket Shelf for Motor	1.50
	$117.50

ELECTRIC MOUTH=ILLUMINATOR.

With Lamp Resistance for 110=Volt Circuit.





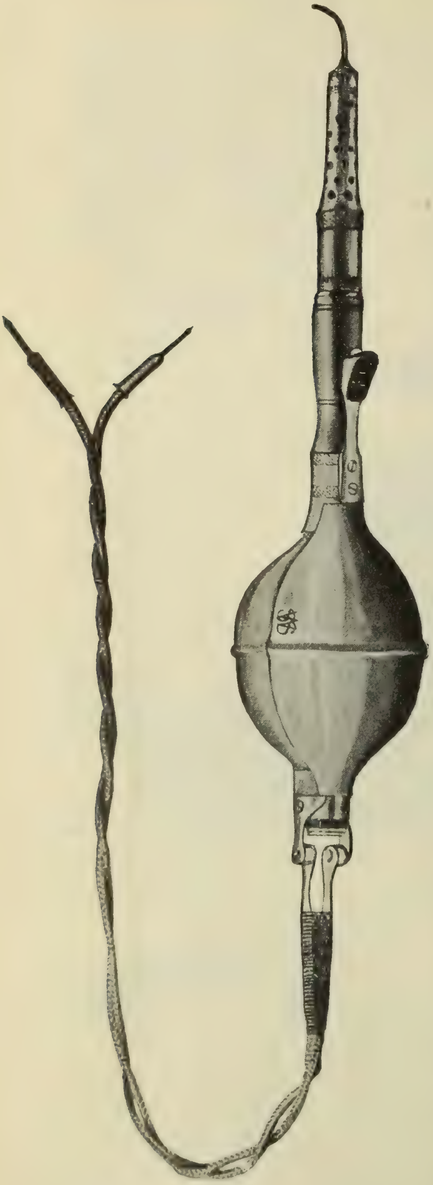
It is to be attached to the head-rest frame of the chair by means of a hinged bracket-arm which gives it universal adjustment. Both the support and the hood over the lamp are adjustable. For directing a strong light into the oral cavity the operator has merely to adjust the Illuminator to concentrate the light of an Edison five-candle power incandescent lamp upon the part of the mouth desired, without affecting the eyes of the operator or patient, and without the slightest discomfort from heat.

This appliance, though originally designed for use with the Edison incandescent circuit, can be operated with a primary battery, such as the Edison-Lalande, or a Storage Battery. When run by the incandescent current, an excellent resistance may be provided by coupling the Illuminator in series with a thirty-two-candle power lamp as shown. (The bracket support K is a now made in two styles to fit either the Wilkerson or the Watkins Head-rest. Always designate Head-rest in ordering.) The large lamp will illuminate the entire office.

Price, Electric Mouth-Illuminator, including Bracket and
7 ft. Conducting Cord.............................. $15.00
" Resistance Lamp, mounted on Walnut Block, extra 4.00

We can furnish Illuminator for 25-volt current. Prices on application.

Improved Electric Hot-Air Syringe, No. 1 A.



Half size.
Cord is 7 feet long.

Patented September 25, 1894.

The most important of the improvements in this well-known appliance is the modification of the nozzle. The point is made of metal and the body of the nozzle of glass, with a perforated metal cover to which the metal point is attached by a screw-joint. The coil of platinum wire which is heated by the current is inclosed within the glass tube, and extends only to the screw-joint.

This combination affords several advantages. The glass tube retards the waste of heat by radiation. The perforated metal cover allows the operator to see when the wire is hot and also prevents to a considerable degree the over-heating of the nozzle. An air-space is provided between the glass and its cover to assist in keeping the body of the nozzle cool. Making the point detachable above the end of the coil avoids any chance of interfering with the adjustment of the coil and so causing a short circuit. The metal point is small enough to enter any canal.

Another improvement is a modification of the form of thumb-switch, making it more convenient and more comfortable.

We have also modified the cord connections by substituting the thumb-screws with cup-shaped, broad-surfaced contacts, and providing spring connections for the cord to correspond, preventing heat at the contact points.

Our Improved Electric Hot-Air Syringe will be found an efficient, time-saving appliance. With the connections properly made, a touch upon the switch under the thumb gives the dentist, on compressing the rubber bulb, an instant and continuous current of heated air, which can be regulated from slightly warm to the hottest blast.

Can be used on incandescent circuit with our electrical outfits where the Transformer is used, or with Storage Batteries, the Partz Motor Battery No. 6, or the Edison-Lalande Battery.

Voltage, 3 to 4 volts; current, 4½ amperes.

PRICES.

No. 1 A, with Rubber Bulb and 7 ft. Connecting Cord......	$15.00
Glass-lined metal Tips for old style No. 1 Electric Hot-Air Syringe	1.00

IMPROVED DENTO-ELECTRIC CAUTERY.

FOR OBTUNDING SENSITIVE DENTIN.

We have improved the Dento-Electric Cautery in several features.

The first of these is in making the loop-holder detachable, so that other appliances, as, for example, a root-drier, can be used upon the same handle. The sockets are split tapered tubes, which thus form springs and retain the loop-holder firmly. The set-screws formerly used to hold the wire are discarded, permitting a reduction in the size of the loop-holder.

The second is the providing of large contacts for the connecting cords, similar to those of the Improved Electric Hot-Air Syringe. The same cord answers for both appliances.

A third improvement is the reduction of the size of the appliance, giving it a neater appearance.

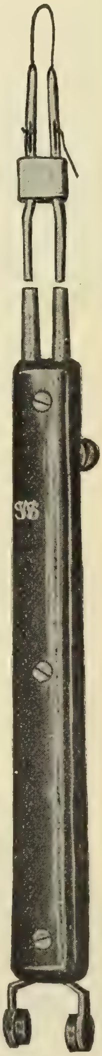
The Dento-Electric Cautery is a convenient method of applying electricity to the obtunding of sensitive dentin, particularly on the cutting-edges of worn-down teeth. Dr. Flagg used it with the greatest satisfaction more than twenty years ago, and continuously from that on. He was so impressed with its efficacy that he publicly recommended it as the "promptest of all continuously effective obtunders," and as one which would "sometimes meet the indications in certain cases where nothing else will give relief."

No obtundent is absolutely universal. Electricity will succeed as often as any other, and the Dento-Electric Cautery offers a convenient means of applying it.

As now made the Dento-Electric Cautery operates by means of a loop of platinum wire (No. 26, B. & S. gauge) which is held in contact with metal conductors which pass through a hard-rubber handle, the conducting wires being coupled to terminals at the end of the handle.

In use the appliance is held in the hand somewhat after the manner of a pen or pencil in writing, and the platinum loop, when properly heated by the electric current, is passed back and forth over the sensitive dentin. The circuit is closed by pressing the button near the forward end of the handle, and pushing it forward. This locks it with the circuit closed, which can be broken again by pulling the button back to its original position. The loop, when destroyed, is readily and inexpensively replaced.

This Cautery can be used on incandescent circuit with our electrical outfits where the Transformer is used. It can also be used with one or two cells of a storage battery, or with four cells of the Partz Motor Battery No. 6 arranged two in series and two on multiple, or with six or eight cells of the Edison-Lalande Battery.



Voltage, 3 and 4 Volts; Current, 10 Amperes.

PRICES.

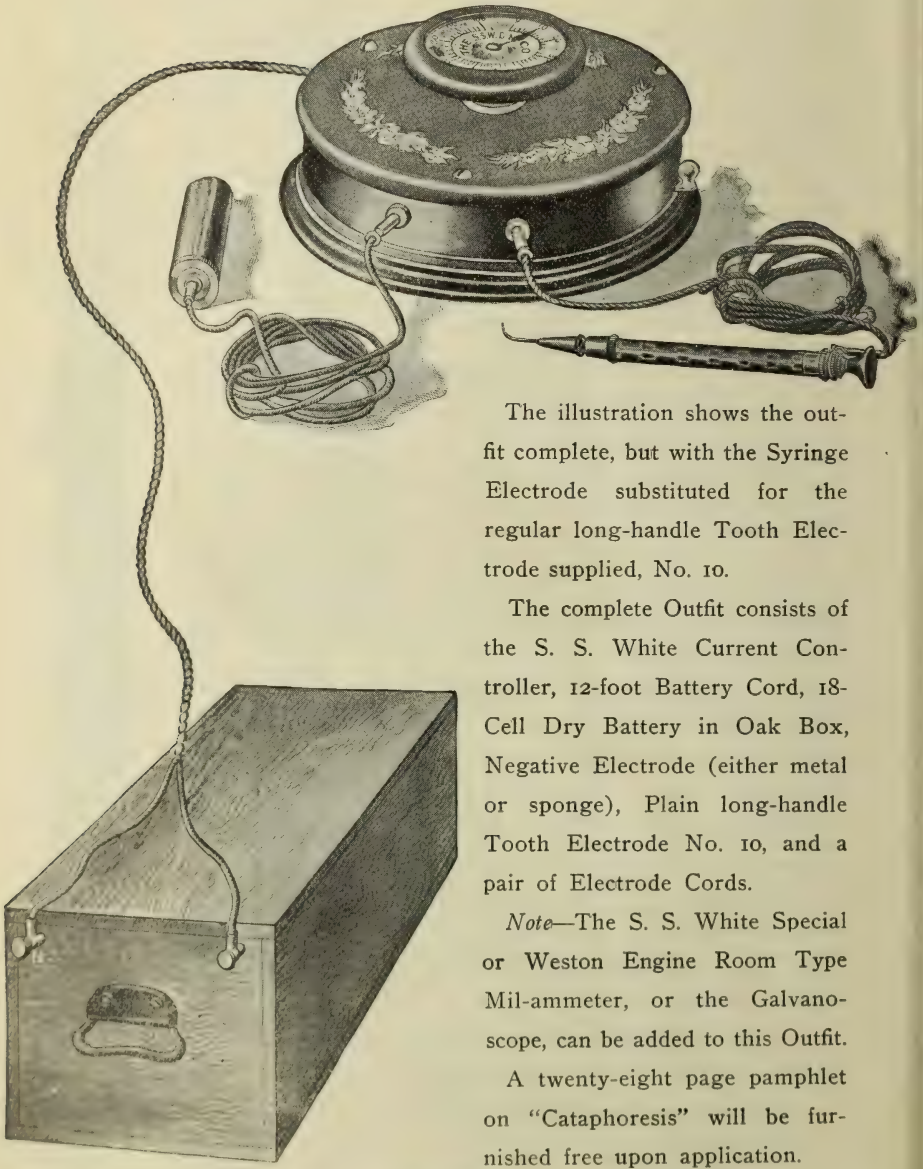
With 7 ft. Cord, with special connections		$8.00
Without Cord		6.25
Handle separate		4.50
Special Cord for Cautery or Hot-Air Syringe		1.75
Point with Ivory Separator and Platinum Loop		1.75
Extra Platinum Loops	each	.10
Four Cells Partz Battery No. 6 for same		18.00

THE S. S. WHITE DENTAL MFG. CO.'S

Cataphoric Outfit, No. 1.

Patented September 20, 1898.

WITHOUT MILLI-AMPEREMETER.



The illustration shows the outfit complete, but with the Syringe Electrode substituted for the regular long-handle Tooth Electrode supplied, No. 10.

The complete Outfit consists of the S. S. White Current Controller, 12-foot Battery Cord, 18-Cell Dry Battery in Oak Box, Negative Electrode (either metal or sponge), Plain long-handle Tooth Electrode No. 10, and a pair of Electrode Cords.

Note—The S. S. White Special or Weston Engine Room Type Mil-ammeter, or the Galvanoscope, can be added to this Outfit.

A twenty-eight page pamphlet on "Cataphoresis" will be furnished free upon application.

PRICES.

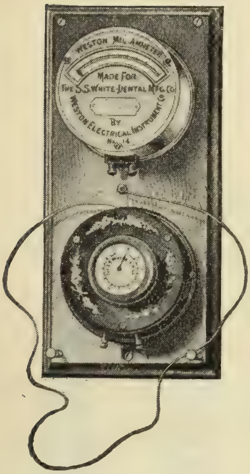
No. 1 Outfit complete with 18-cell Battery	$28.00
No. 1 " " " 24-cell "	31.50

Send for our new pamphlet on Cataphoresis.

THE S. S. WHITE DENTAL MFG. CO.'S

No. 2 Cataphoric Outfit.

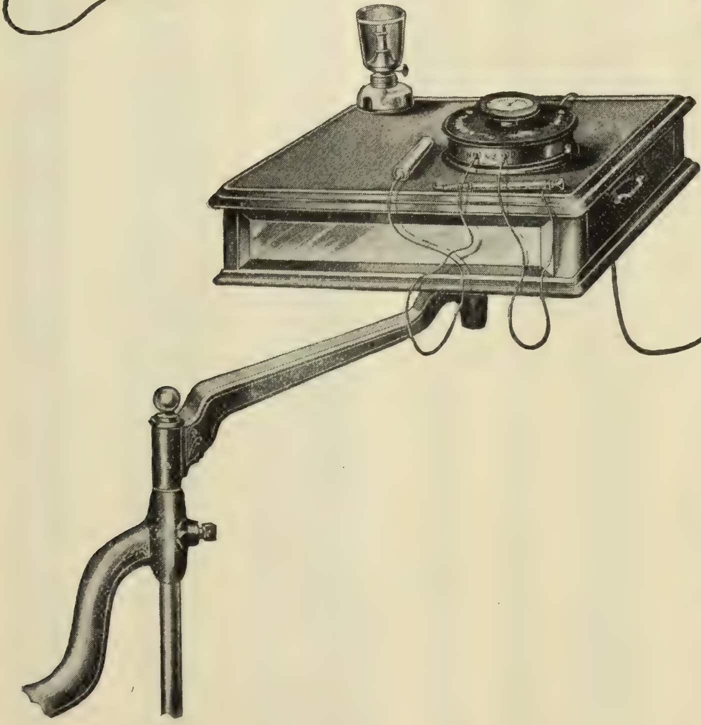
Patented Sept. 20, 1898.


Weston Mil-Ammeter
Made For
The S.S. White Dental Mfg. Co.
By
Weston Electrical Instrument Co.
No. 14

The cut on the left shows the switch-board of the No. 2 Outfit with the Current Controller hung up, as when not in use.

The other illustration shows one method of use, the Controller being placed upon the bracket table for convenience.

Weston Mil-Ammeter
Made For
The S.S. White Dental Mfg. Co.
By
Weston Electrical Instrument Co.
No. 14
To Battery



This Outfit consists of the Special S. S. White Weston Mil-ammeter permanently mounted on a polished cherry wood board, the S. S. White Current Controller connected to the wall board by a flexible 4-way cable, 8 feet long, a 12-foot Battery Cord, an 18-Cell Dry Battery in Oak Box, Negative Electrode (either metal or sponge), Plain long-handle Tooth Electrode, No. 10, and a pair of Electrode Cords.

Other electrodes can be added at list prices.

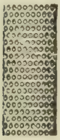
Price	$56.00
" with 24-cell Battery	59.50

Our pamphlet on Cataphoresis—free on application—will tell you just what you want to know, if you are thinking of adopting this agent.

SOCKET HANDLES

FOR AUTOMATIC PLUGGER POINTS.

Styles of Knurls.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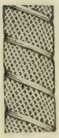
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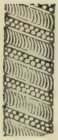
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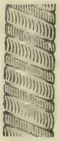
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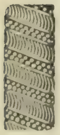
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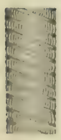
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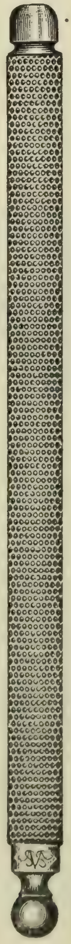
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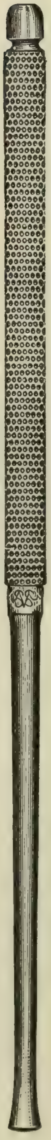
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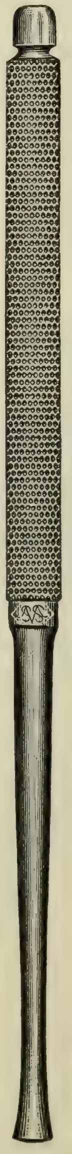
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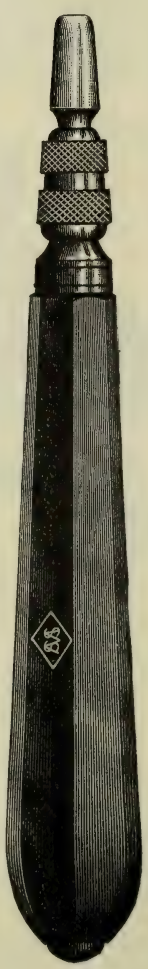
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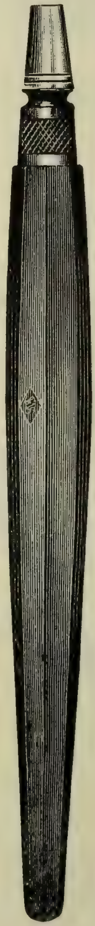
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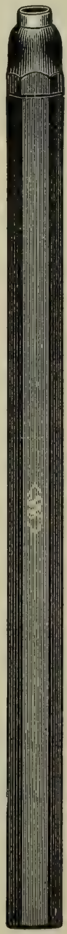
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For prices and description see next page.

SOCKET HANDLES

FOR AUTOMATIC PLUGGER POINTS.

The handles illustrated on this and the preceding page are the same forms as the corresponding numbers in the list of handles for Cone-Socket Points, but the sockets are especially adapted to carry Automatic Plugger Points.

Nos. 3, 4, 5, and 4 and 5 non-rolling, are steel nickel-plated.

Nos. 3, 4, and 5 are made in the six different styles of knurls shown.

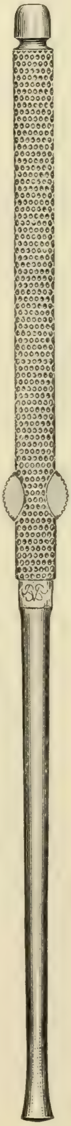
Nos. 4 and 5 non-rolling are made in style A knurl only.

The Steel Handles may be readily distinguished from those for Cone-Socket Points by the rounded socket ends.

No. 8 also has the rounded end, and Nos. 8, 9, and 10 have grooved lines around the socket, which also serves to identify them.

PRICES.

No. 3	per doz.	$1.75
Nos. 4 and 5	"	2.50
No. 8	"	7.20
" 9	"	5.00
" 10	"	3.00
Nos. 4 and 5, non-rolling	"	2.75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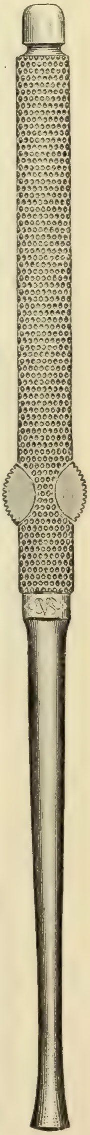
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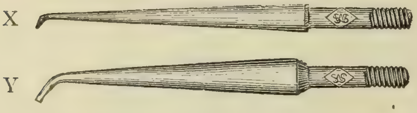
THE ADAPTATION OF SOCKET HANDLES AND CONE-SOCKET POINTS.



In adapting instrument points for use with Cone-Socket Handles, two styles of bit shanks were found to be desirable; a light shaft, *X*, for small, delicate points; and a heavier one, *Y*, adapted to the points which in long-handled instruments require ¼-inch file-cut handles. This same principle of adaptation to use is carried out in the Cone-Socket Handles, any of which will carry any of the points, but operators will have greater satisfaction if they adhere to the suggestions given below as to the place which each Handle is intended to fill.

Handles Nos. 1 to 7 are steel, each in the six styles of knurls illustrated (see page 16). Nos. 8, 8A, 9, 11, are abony, with nickel-plated ferrules. Nos. 10, 10A, and 12, are black rubber. All the handles are shown full size. Their special uses are as follows:

No. 1. Smallest. Generally used for small and medium excavators, explorers, nerve-instruments, etc., with *X* shank.

No. 2. For large excavators, small pluggers, etc., having *X* shank.

No. 3. For heavier hand-points on *Y* shank.

No. 4. For delicate mallet-pluggers, as Varney's, Chappell's, etc., *X* shank.

No. 5. For the larger mallet-pluggers, *Y* shank.

Nos. 6 and 7. Double-end. For spatulas, cement and amalgam instruments, etc. No. 6 for *X* shank; No. 7 for *Y* shank.

Nos. 8, 8A, 9, 10A, and 11, specially for the convenience of operators accustomed to use instruments mounted on large, light-weight handles. Nos. 8, 8A, and 10A are adapted for burnishers, heavy chisels, etc., *Y* shank. Nos. 9, 10, and 11, *X* shank.

No. 12. Is designed especially for using the Moss Fibre Gold Pluggers. It is shaped to afford an easy grip and perfect control, and is equally adaptable to other style of points.

PLIERS FOR INSERTING AND REMOVING CONE-SOCKET POINTS.

In order to set the points firmly in the handles it will be necessary to use more force than can be given with the fingers.

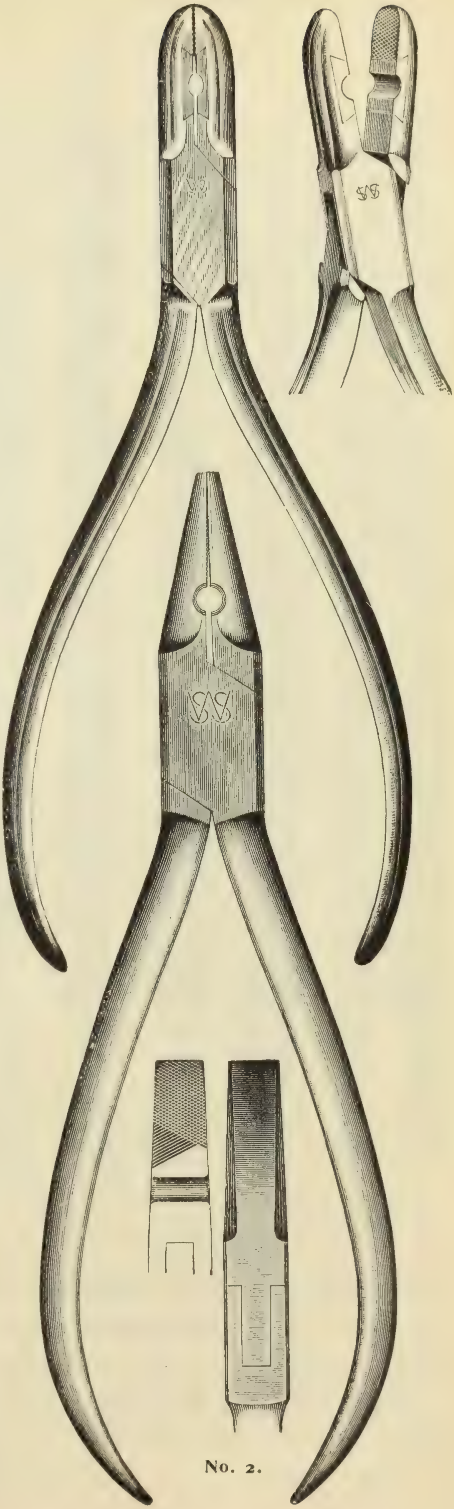
These Pliers are especially adapted for the purpose.

No. 1 is finely finished and nickel-plated. In both jaws are inserted copper plates which prevent the marring of the instruments and give firmer grasp than can be had with the No. 2 Pliers.

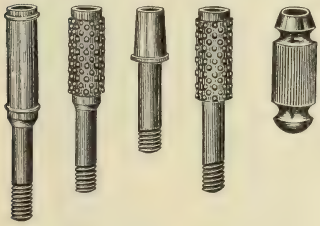
No. 2 is a flat-nosed Plier with depressions ground in the jaws. Polished and nickel-plated.

PRICE.

No. 1	per pair	$1.75
" 2	" "	.90



SOCKET-HUBS.



A and B screw into the Cone-Socket Handles and take Snow & Lewis automatic mallet points.

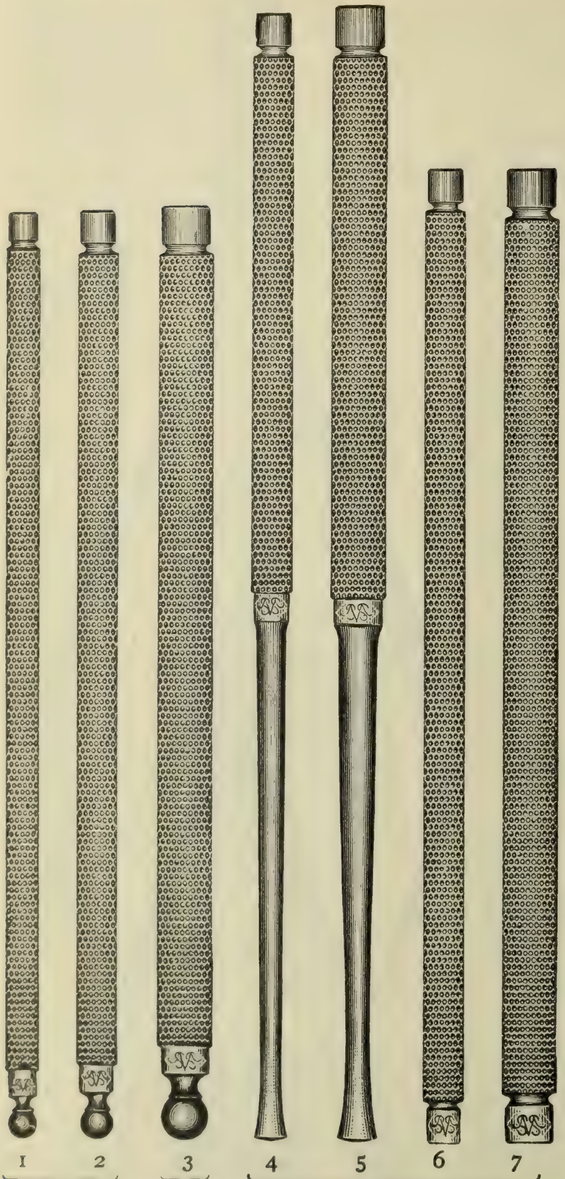
C and D screw into Snow & Lewis sockets and take Cone-Socket points.

E is designed for use between the thumb and finger for rotating cone-socket nerve-instruments.

PRICES.

"A," Hardened Steel,	each	$0.30
"B," Knurled	" "	.15
"C," Hardened	" "	.30
"D," Knurled	" "	.15
"E," "	" "	.15

Socket-Handles for Cone=Socket Points.



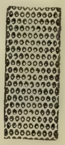
1, 2: $1.25

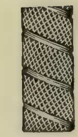
3: $1.75

4, 5, 6, 7: $2.50

Price per doz.

Styles of Knurls.


A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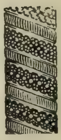
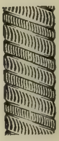
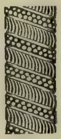
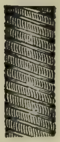

C


D


E

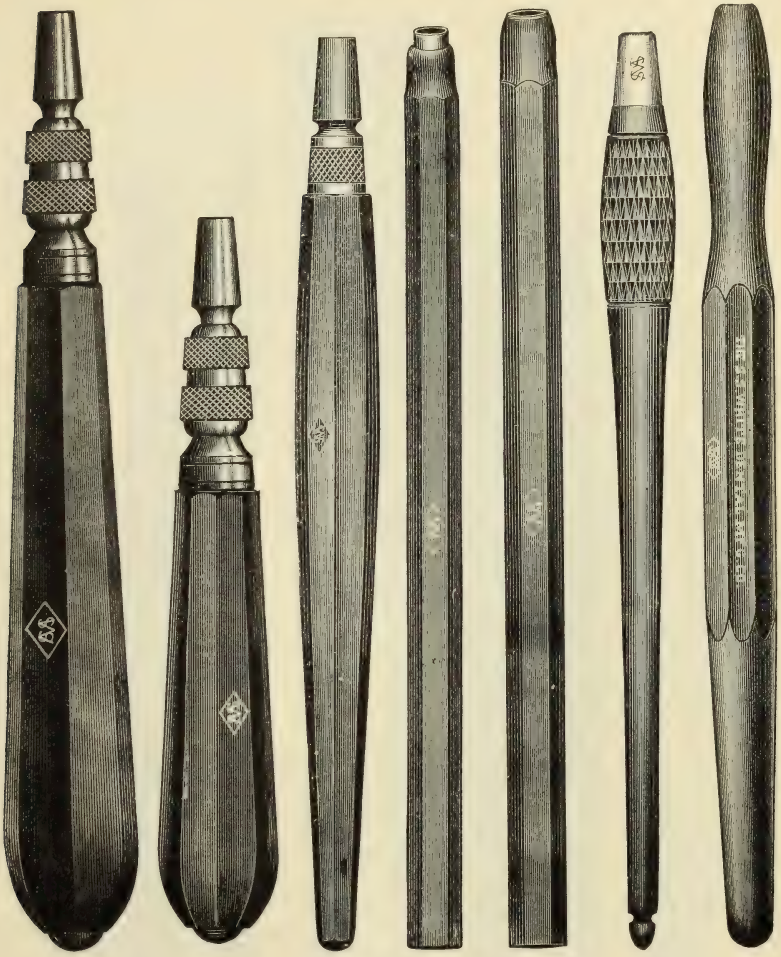

F

Note—Order Handles by Number. Order Style of Knurl by Letter.

CONE-SOCKET HANDLES IN BOXES.

Cone-Socket Handles are put up in boxes. They are not assorted, but Nos. 1 to 7 are put up in boxes containing six handles of a particular number and knurl; Nos. 8 to 12 are put up singly.

Socket Handles for Cone-Socket Points.



Design Patent November 14, 1899.

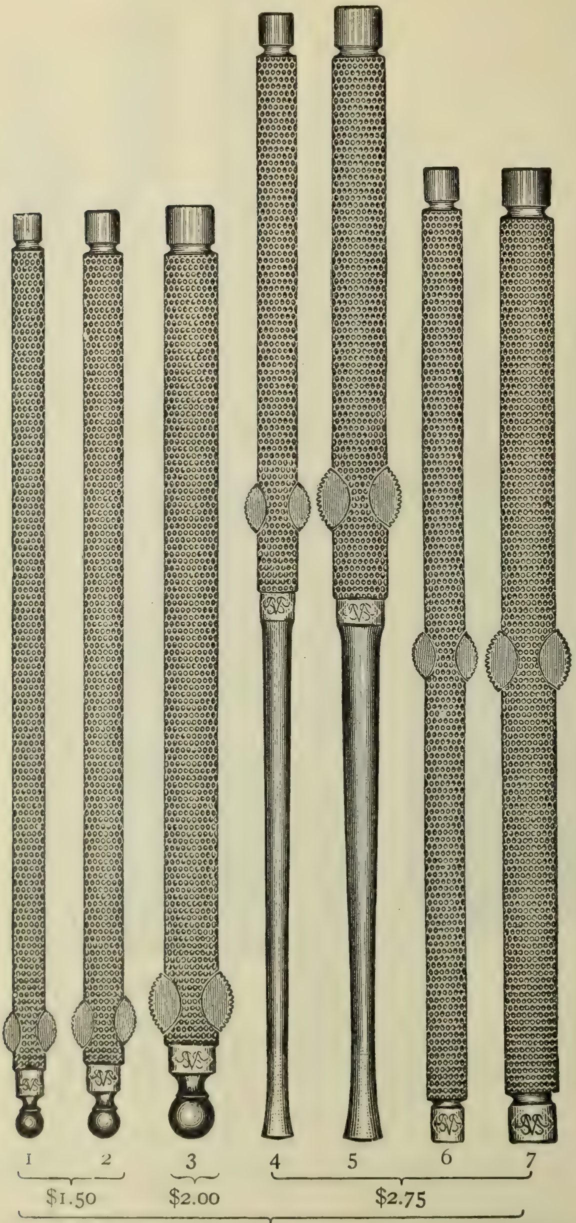
8	8A	9	10	10A	11	12
$7.20	$7.20	$5.00	$3.00	$3.00	$4.00	$6.00

Price per dozen.

This fact is clearly evident with regard to "Revelation" Burs,—they cut faster, cleaner, with less pain to the patient; they clear perfectly; they heat the tooth less than any others; they are more durable than any others. They are therefore better and cheaper to use than any others

NON-ROLLING CONE-SOCKET HANDLES.

Patented November 26, 1895.



Price per dozen.

The little stops on the sides will prevent the handles rolling about or off the bracket-table as the result of a sudden jar, or should the table happen to be out of level. They also assist in giving a firmer grip of the handle, which is sometimes desirable.

Made only in "A" Knurl.

SOME APPROVED OFFICE PREPARATIONS.

PYROZONE (H_2O_2).

The main reason for the constantly growing popularity of the Pyrozone preparations is that they are H_2O_2 all the time. The dentist who takes one of these preparations for his hydrogen peroxid is sure that he has always hydrogen peroxid. They are absolutely stable solutions of that drug. Two forms.

Medicinal Solution of Pyrozone, 3 per cent. H_2O_2 Aqueous.

Wherever a cleansing mouth-wash is required, as in abscess and pyorrhea, Medicinal Pyrozone is the indication. As an antiseptic in all infectious conditions of the oral mucous membrane it produces remarkable results. No risk of toxic effects. Put up in 4-oz. glass-stoppered bottles.

Price, Medicinal Pyrozone......................	per bottle $0.50
“ “ “	“ dozen 4.50

Caustic Solution of Pyrozone, 25 per cent. H_2O_2 Ethereal.

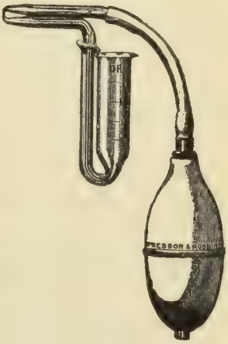
Caustic Pyrozone is a powerful and safe antiseptic and bleacher; causes no permanent injury to normal tissue. Has the special stimulating characteristic sometimes required in pyorrhea. Put up in sealed glass tubes.

Price, Caustic Pyrozone.........................per tube $0.75

The sale of the 5 per cent. Ethereal Solution of Pyrozone has been discontinued. This solution can readily be prepared by diluting 1 part of 25 per cent. ethereal solution with 4 parts of pure sulfuric ether. The container must be clean and glass-stoppered.

Pamphlet describing pyrozone and detailing methods of use free on application.

The 3 per cent. solution can only be sent by express. The 25 per cent. solution can be mailed at an additional expense of 15 cents.



Atomizer for Pyrozone.

An Atomizer, specially adapted for the exhibition of Pyrozone, is made in three forms: straight spray, up spray, and down spray.

Price, with one Spray Tube, either form	$1.25
“ Extra Spray Tubes for same..each	.75
“ Pyrozone Inhalers............ “	.25
“ “ Syringe .... “	.25

SEDATIVE ANTISEPTIC DRESSING.

Aristol, gr. vii;
Ol. Cassia, ʒiii.

An excellent medicament for canal dressings and as a topical dressing in acute pulpitis. Also valuable as an application in pyorrhea alveolaris, especially where there is soreness. Put up in half-oz. colored bottles.

Price......................................per bottle $0.30

SOME APPROVED OFFICE PREPARATIONS.

AMMONIA, CLEAN NITRATE OF.

We have been through the trouble of trying to get clean Nitrate of Ammonia; went through it long ago, for years; finally solved the difficulty in our usual way, by putting in a plant to make it ourselves.

Since then we have been making our own Nitrate of Ammonia, and that's one reason for the purity of our Nitrous Oxid Gas; the Ammonia from which it is made is cleaner, purer, whiter, and the gas is more easily purified.

We are prepared to supply this high-grade Nitrate of Ammonia in quantities to suit, by the pound, or barrel, or ton.

Prices fluctuate. Figures quoted below are correct this day, December 1. To-morrow they may be a little higher or a little lower.

PRICES.

Nitrate of Ammonia		per lb.	$0.24
" "	in 5-lb., 10-lb., or 25-lb. box	"	.22
" "	in 50-lb. box	"	.21

Prices in larger quantities will be supplied on application.

CAVITINE.

A superior, quickly-drying lining for cavities, which is an effective insulator and preventive of pulp-irritation arising from thermal conduction by metallic fillings, or the chemical irritation of some of the zinc plastics. Cavitine is colorless, and aids in the preservation of the walls lined with it, being unaffected by moisture or chemical agents coming in contact with the tooth.

The properly prepared cavity should be perfectly dried with warm air, and carefully coated with Cavitine on a little wisp of cotton wound on a fine-pointed instrument. Follow with blasts of warm air, and fill at once.

Keep Cavitine closely stoppered, and avoid the vicinity of a flame while the bottle is open.

Price..per bottle $0.25

CREASOTE..

Is a stimulant, sedative, rubefacient, escharotic, styptic, and antiseptic. Useful in the relief of odontalgia, hypersensitive dentin, alveolar abscess, pericementitis, suppurating pulps, devitalizing pulps, etc.

Price..........................1-oz. glass-stoppered bottle $0.25

CREASOTE, PURE WOOD.

Is a much finer grade than that previously mentioned, and is to be preferred for dental purposes.

Price..........................1-oz. glass-stoppered bottle $0.50

GLYCEROL (GLYCERIN).

Is useful as a solvent and emollient; as a solvent alone, and as both solvent and emollient, when combined with other substances can be employed with great benefit in diseases of the mucous membranes of the mouth, as stomatitis, ulcers, aphthæ, alveolar abscess, abraded surfaces, etc.

Price...2-oz. bottle $0.25
" ....8 " " .60

SOME APPROVED OFFICE PREPARATIONS.

NERVE DEVITALIZING FIBRE.

When a pulp is to be devitalized, it is well to use an agent which is sure and quick in its operation, and as painless as may be. Our Nerve Devitalizing Fibre is such an agent. It is a preparation of arsenious acid, creasote, tannin, and opium. It thus has all the qualities needed. It is not new and untried, but has a long and honorable career behind it. Thousands of pulps have been lulled to forgetfulness of their troubles through its action.

Put up in glass jars with metallic screw caps.

Price..per jar $0.75

NERVE PASTE.

A proper combination of arsenious acid and creasote that has proven to be a standard application to pulps when they are condemned to devitalization. Does its work promptly and with the least pain.

Price..per bottle $0.50

ROBINSON REMEDY.

This well-known preparation (formula by Dr. Jeremiah Robinson) is an excellent obtunder for sensitive dentin; will usually insure a painless operation, but will not injure the hard tissues. In case of pulp exposure its application may at first be slightly painful, but an eschar forms so quickly and strongly that capping with any of the plastics may be at once proceeded with. It also acts speedily and effectively in the treatment of pyorrhea.

Full directions accompany each bottle.

Price..per bottle $0.50

SODIUM AND POTASSIUM.

Prepared by DR. J. E. WARD.

Many dentists know the efficacy of the sodium and potassium treatment for putrescent root-canals; the promptness with which the preparation goes to work on the canal contents, and thus right on the spot makes a soap which so cleanses and purifies the canal that it can be filled safely without further treatment. There is nothing so effective in getting to the end of a root and so limited in its irritative properties as this combination. It is just the thing for cleaning a tooth before crowning; it is also a good bleaching agent, whether used alone or in conjunction with pyrozone. Teeth with putrescent pulps can be treated and filled at one sitting, if sodium and potassium is used.

The new form, hermetically sealed glass tubes, in which the preparation is now supplied, will be welcomed, as it materially increases the facilities for manipulation.

Price............................per box containing 6 tubes $1.00

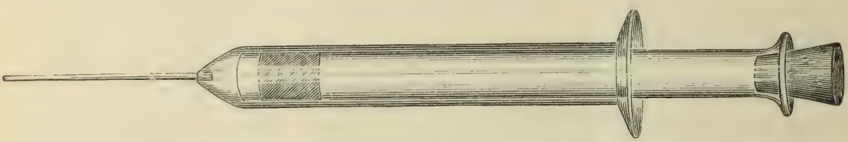
SMALL GROUND-GLASS-COVERED

BOTTLES FOR OFFICE PREPARATIONS.

This small pattern Ingersoll Bottle, known as No. 6, will be found extremely handy in the office. There are many office preparations of which only minute quantities are used, and many others which, from their nature, have to be kept in tightly closed bottles to prevent disintegration. The ground-glass cover fills this need, and is more readily removed than the usual ground-glass stopper. The flat top of the cover can be utilized for labeling. The bottle holds about a half-ounce.

Price, No. 6..........................each $0.15; per doz. $1.60

THE ASEPTIC SYRINGE, No. 35 A.

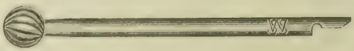


In this device we have improved upon our Minim Syringe No. 29 by forming on the glass barrel-mouth a wide flange for a finger hold, and by making a recess for a cotton-wound piston-packing on the closed end of an easy-fitting glass piston tube, which also has a flanged mouth to be fitted with a cork stopper. The result is an effective piston syringe that can be readily rendered aseptic with hot water for use with any medicated solution. The piston packing can be quickly removed and renewed for the employment of another solution. The hollow piston serves to contain soluble medicated granules, or a concentrated solution to be diluted by putting one or more drops into the syringe barrel, or it will hold alcohol or ether, for cavity-drying.

The platinum pipe may be sterilized by holding it above the annealing flame, or with burning alcohol. The cut shows the full size. It is a superior syringe for injecting antiseptics into pulp-canals, sinuses, and pyorrhea pockets or sulci.

Price..each $0.60

ROUND BUR, No. 20 BUR GAUGE.

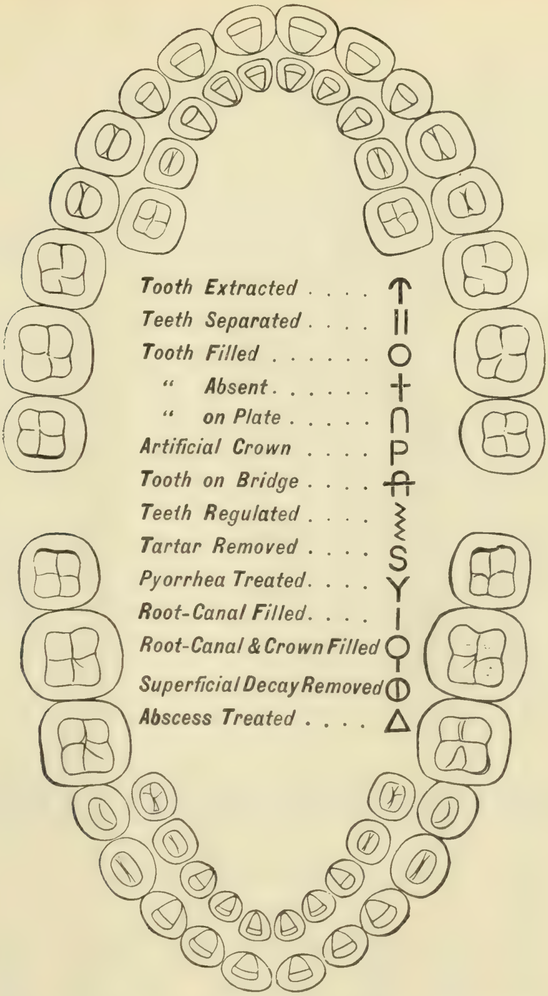


This specially made hand-cut Bur is for use in large cavities. It is also useful as a vulcanite bur in finishing plates.

For Nos. 6, 7, and 8 Hand-pieces. Specify for which it is wanted in ordering.

Price..each $0.40

Allport's Improved Registering Dental Ledger.


Tooth Extracted . . . . ↑
Teeth Separated . . . . ‖
Tooth Filled . . . . . . O
" Absent . . . . . . +
" on Plate . . . . . ∩
Artificial Crown . . . . P
Tooth on Bridge . . . . ₱
Teeth Regulated . . . . ≷
Tartar Removed . . . . S
Pyorrhea Treated. . . . Y
Root-Canal Filled. . . . |
Root-Canal & Crown Filled ♀
Superficial Decay Removed Φ
Abscess Treated . . . . Δ

Has been extensively used by the dental profession for more than a quarter of a century, and holds its own to-day as the most popular account book for dentists. It covers the needs of any form of practice, and affords a simple, easily-kept, accurate record.

Two accounts to the page, each with diagram as shown with place for name, reference, date of operation, charges, and credit for amounts paid.

Good paper, substantially bound, with ample index. In stock regularly as priced below.

Larger books (more pages) made to order at moderate prices.

PRICES.

340	Pages,	Half Turkey,	Cloth	Sides	$3.50
340	"	"	Roan, Paper	"	3.00
172	"	"	" "	"	2.00

THE WARREN IMPROVED DENTAL LEDGER.

No. 1.

One of the most important features in the Warren Dental Ledger is the diagram, admittedly the best ever offered.

The headings cover all the usual operations, and an ample column offers opportunity for making special notes.

308 pages, each 10 x 15 inches, 88 of which have three diagrams each, 132 having two, and 88 having one each, thus affording opportunity for long, medium, and short accounts.

The method of keeping an account (demonstrated on the opposite page) is to number the operation consecutively, placing the same number on the tooth treated, then the date, number, and amount, with a check mark under the heading which designates the operation.

Bound in red leather, red cloth sides, with red edges. Ample Index.

Price.. $3.00

We can supply Warren Dental Ledgers, made to suit special needs on order. Thus, if one wishes to have a book composed entirely of one account or two accounts or three accounts to the page, or omitting any one of the sizes, we will be glad to quote special prices.

WARREN IMPROVED DENTAL LEDGER.

No. 2 (SQUARE FORM).

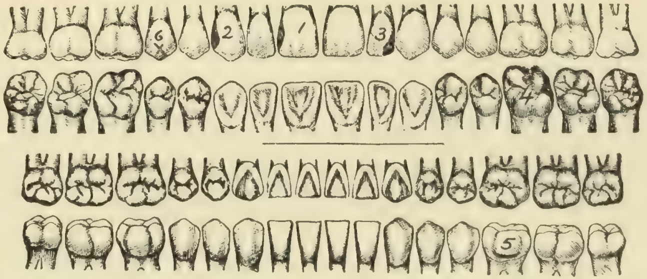
In response to a number of requests we have brought out a new edition of the Warren Improved Dental Ledger with pages about two-thirds the length of the well-known form. The book is thus about 10½ inches square. There are two sizes of accounts, two to the page and one to the page, and these are distributed throughout the book, first eight of the one-account pages, then eight of the two-account and so on, with an extra eight of the two-account pages at the end. There are 312 pages in the book, giving 320 short accounts and 152 long ones, a total of 472. The short accounts contain seven lines beside the diagram, spaces for name and address, etc.

Bound in red leather, red cloth sides, with red edges. Ample Index.

The diagram used in these Ledgers is universally conceded to be the best ever offered to the dental profession, as it shows every surface of each tooth equally well.

Price.. $2.50

THE WARREN IMPROVED DENTAL LEDGER.



Mr. John Doe

1769 Easy St.

Recommended by Mr. Richard Roe.

1895		No.	Gold Filling.	Amalgam Filling.	Phos. Zinc Filling.	Gutta Percha Filling.	Tin Filling.	Artificial Crown.	Bridge.	Treatment.	Cleaning Teeth.	Extraction.	Artificial Denture.	Time Reserved.	Dr.		Cr.		MEMORANDA.
Feb.	20	1	✓												7	50			
″	″	2	✓												5	00			
″	21	3			✓										2	50			Pulp capped with Asbestos
″	″	4		✓											2	50			
″	″	5				✓									2	50			
″	23	6						✓							20	00			Richmond Crown - two pins.
March	3																40	00	
															$40	00	$40	00	

Dentists' Pocket Diary and Appointment Book,

FOR

REGISTERING APPOINTMENTS FOR DENTAL OPERATIONS.

MONDAY. 19

8		1	
9		2	
10		3	
11		4	
12		5	

TUESDAY. 19

8		1	
9		2	
10		3	
11		4	
12		5	

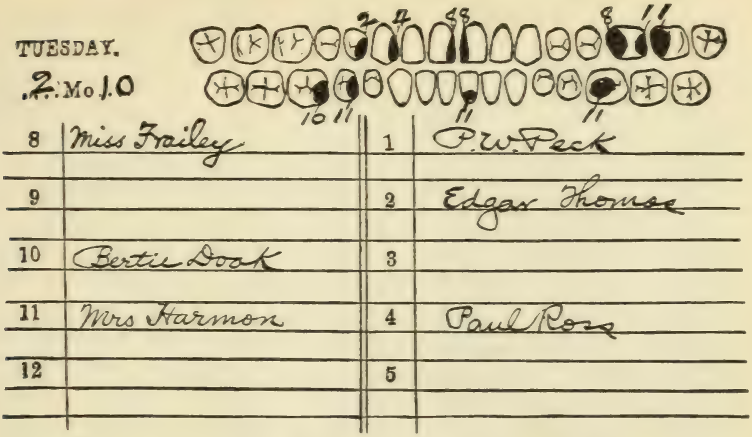
WEDNESDAY. 19

8		1	
9		2	
10		3	
11		4	
12		5	

The Diagram shows the exact size and style of a page of the **Pocket Diary**, presenting, when open, engagements for one week. **The figures** denote the hour of the engagement. It contains blanks for 54 weeks, **and**, being without date, is good for any time. It has also a neat **memorandum** attached.

Price, Flexible Cover, Gilt Edge..............................	$0.55
" " " " " with Pocket and Tuck........	.80

THE DIAGRAM APPOINTMENT BOOK.


2
4
4 8
8
11
10 11
11
11

TUESDAY.
2 Mo 10

8	Miss Frailey	1	P.W. Peck
9		2	Edgar Thomas
10	Bertie Dook	3	
11	Mrs Harmon	4	Paul Ross
12		5	

The feature of this Appointment Book is the facility which it affords of making a brief but clear memorandum of the work to be done for each patient at the time the appointment is made.

For each day there is a diagram of the teeth. As appointments are made, the hour set apart is noted upon the diagram, opposite the tooth or teeth to be treated. When the patient takes his place in the chair, a glance at the diagram shows the operator at once where the work is to begin.

The illustration shows a typical day's markings.

The book is 6¾ x 4¼ inches. In the front are calendars for three years, and a table showing the number of days from any day in one month to the same day in any other month; following this are the appointment pages, a full week's appointments being shown when the book is opened. Back of this are pages for memoranda and blanks for a monthly cash account and yearly summary. Supplied in cloth or leather.

PRICES.

Cloth	$0.30
Leather	.50

5000 COPIES
OF THE
DENTAL HYGIENIST, "INFORMATION,"

Are now sent to dentists every month. It is filled each month with

VALUABLE INSTRUCTION

In Dental and Oral Hygiene for dentists, patients, and school children. Vol. II begins with the November issue.

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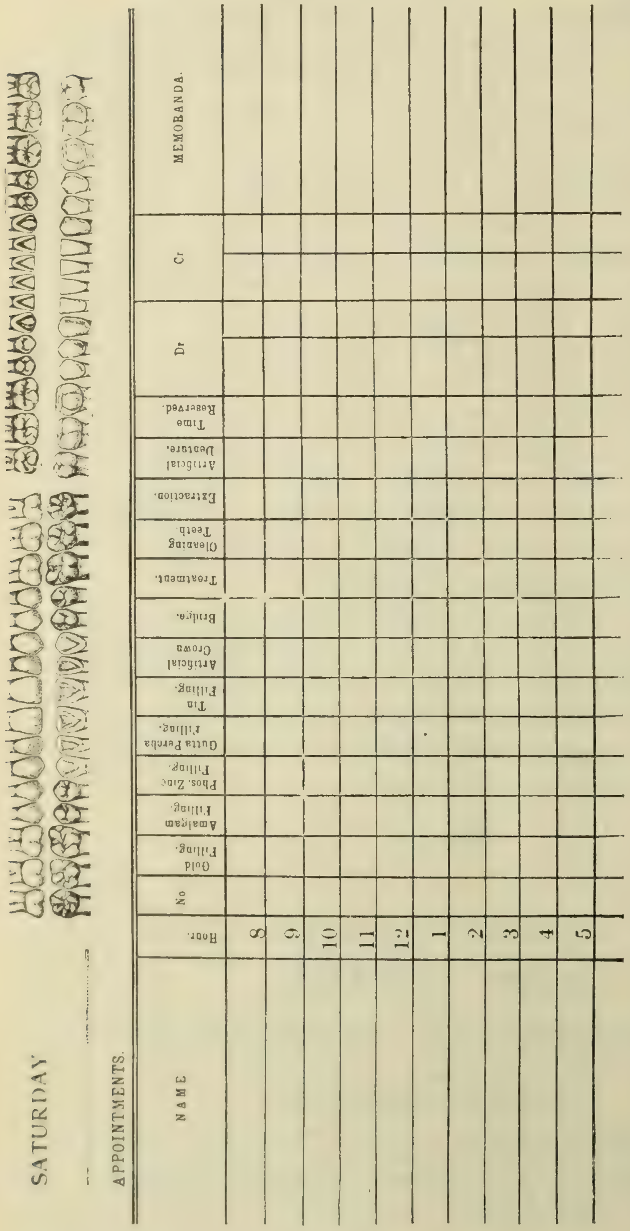
L. P. BETHEL, D.D.S., M.D., Publisher,
KENT, OHIO.

THE S. S. WHITE
DENTAL APPOINTMENT BOOK NO. 3.


SATURDAY
APPOINTMENTS.
NAME
Hour.
No
Gold Filling.
Amalgam Filling.
Phos. Zinc Filling.
Gutta Percha Filling.
Tin Filling.
Artificial Crown
Bridge.
Treatment.
Cleaning Teeth.
Extraction.
Artificial Denture.
Time Reserved.
Dr
Cr
MEMORANDA.
8
9
10
11
12
1
2
3
4
5

The opportunity to get an Appointment Book with the unequaled Allan diagram will, we doubt not, be accepted with pleasure by many dentists, more especially those who use the Warren Dental Ledger, which is founded on the same diagram.

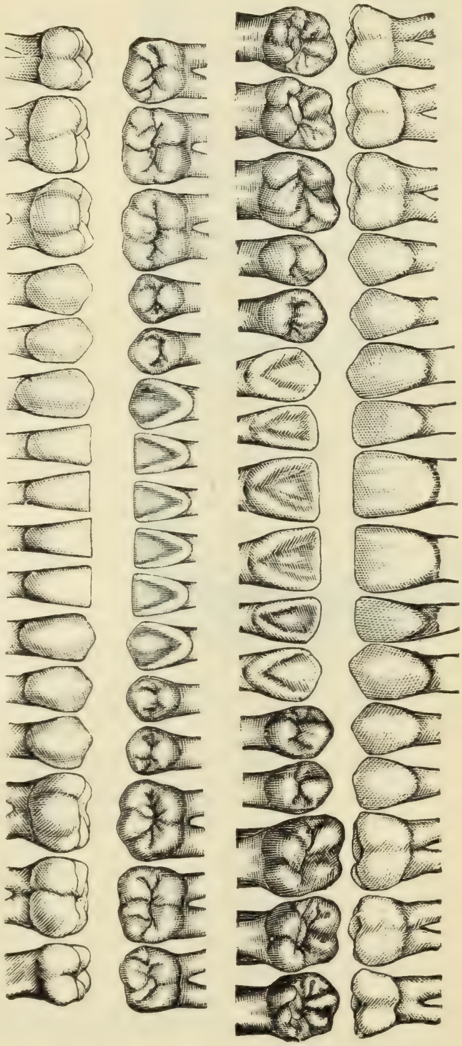
The book is oblong; the pages, of which there are 312, are 5¼ x 9 inches. The diagram is printed in red (natural size), so that marks upon it will be more readily seen. Below the diagram are the spaces for appointments from 8 A.M. to 5 P.M., with headings for all the usual operations, and memorandum space for any special notes. The reduced reproduction of a page herewith gives a clear idea of the advantages of this book.

Printed on good paper, paged and indexed, bound in cloth, with leather back; red edges.

Price.... $1.25

RECORD OF CATAPHORIC OPERATIONS.

Devised by WESTON A. PRICE, D.D.S.



Tooth No........	Mill. Amp.	Volts	Resistance	Size of Cavity	Time	Medicine
Start						
Finish						

No one thing will tend more to confirm the value of Cataphoresis in dental practice than the keeping of a dental record of cases, unless it be the experiences noted down in the records.

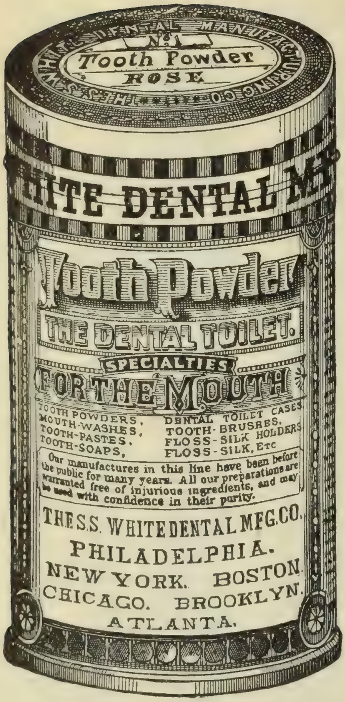
This diagram affords opportunity for a complete record of any cataphoric operation in dentistry. Below the diagram is a space for remarks, and blanks for the name of the patient and date of the operation.

The size of the page is 5½ by 7 inches, the same as the Allan Examination Record.

Put up in books of 100 leaves, paged and indexed, with heavy manilla cover and cloth back.

Price..each $0.40

TOOTH-POWDERS.



FIVE VARIETIES.

No. 1, Rose,

No. 1, Wintergreen,

No. 2,

No. 3,

Phenated,

Put up in Handsome Enameled Metal Cans and Flasks. The quarter-pound, half-pound, and pound Cans are round; the four-pound are square with rounded corners. The Flasks (see page 32) are round, with screw-top, and hold something more than two ounces.

No. 1 TOOTH-POWDER.

Two Flavors—Rose and Wintergreen.

An Elegant, Pleasant, and Efficient Dentifrice, highly recommended as a Toilet Article for both old and young.

This Powder has been known to the dental profession and to the public more than a third of a century. It has had an immense sale, and has received general and hearty indorsement. It is intended to meet all the requirements of a dentifrice for general use, combining elegance with efficiency, and it may be used with pleasure and benefit at all ages. It is highly perfumed with delicate oils, and is in every respect as perfect as we know how to make it.

Please state the flavor desired. When flavor is not mentioned we send Rose.

PRICES.

Rose or Wintergreen Tooth-Powder,	4-lb.	cans	....	each	$5.00
" " "	1-lb.	"	....	"	1.50
" " "	½-lb.	"	....	"	.90
" " "	¼-lb.	"	....	"	.50

A discount of 15 per cent. will be made to dentists on 5-lb. lots; 25 per cent. on 10-lb. lots, and 30 per cent. on 50-lb. lots.

PHENATED TOOTH=POWDER.

Designed to combine the ordinary abrasive and antacid qualities of a dentifrice with disinfecting and deodorizing properties. It is recommended in those cases where the condition of the teeth or gums causes an offensive breath, and in scorbutic and aphthous conditions of the mouth. It is pleasant to the taste, cooling to the gums, sufficiently abrasive for cleaning the teeth, and is altogether unexceptionable as a daily toilet article.

PRICES.

Phenated,	4-lb.	Enameled Cans	each	$5.00
"	1-lb.	" "	"	1.50
"	½-lb.	" "	"	.90
"	¼-lb.	" "	"	.50

On Phenated Tooth=Powder a discount of 15 per cent. will be made to dentists on 5-lb. lots; 25 per cent. on 10=lb. lots, and 30 per cent. on 50=lb. lots.

No. 2 TOOTH=POWDER.

For real value as a cleansing powder for daily use the No. 2 is equal to the No. 1, but it is less elegantly colored and less delicately perfumed. Like the No. 1, however, it may be used with entire confidence by children and adults.

Price,	4-lb.	Enameled Cans	each	$3.50
"	1-lb.	" "	"	1.00
"	½-lb.	" "	"	.60
"	¼-lb.	" "	"	.35

No. 3 TOOTH=POWDER.

Though designed more for real efficiency than for elegance, this is nevertheless an agreeable and excellent preparation. It is composed of pure materials, and meets all the requirements of cleanliness. It differs from the higher-priced powders in color, odor, and taste,—not in essential qualities.

Price,	4-lb.	Decorated Tin Cans	each	$2.50
"	1-lb.	" "	"	.75
"	½-lb.	" "	"	.45
"	¼-lb.	" "	"	.25

A discount of 10 per cent. on Nos. 2 and 3 in 10=lb. lots will be made to dentists.

DECORATED TOOTH-POWDER FLASK.

Fig. 1.

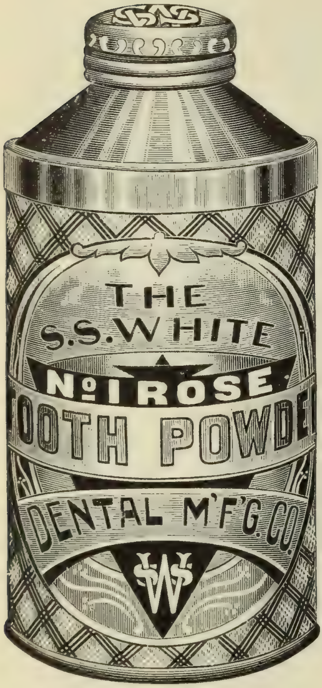
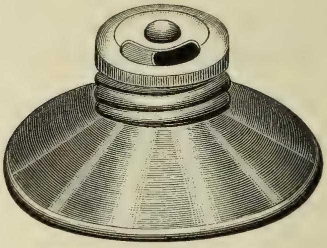


Fig. 2.



In this device we offer an improved tooth-powder holder. The special improvement is in the opening in the top, which can be adjusted to permit varying quantities of powder to pass. When closed the powder cannot sift out in the trunk or hand-bag. It has a screw-cap, which being removed shows the adjustable opening, Fig. 2. By this arrangement the flow of the powder is entirely under control.

It is well made, will stand considerable hard usage, and is thus better adapted to the needs of travelers than glass bottles, while its neatness and usefulness will commend it to all classes.

The Flask is handsome, convenient, and substantial. It holds something more than two ounces of tooth-powder.

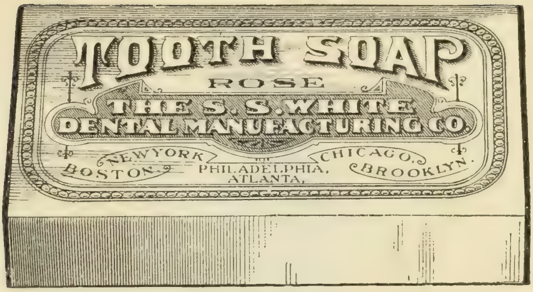
With a view to affording dentists the opportunity to supply our Flask to their patrons, we offer it in quantities at prices which will pay them to handle it.

PRICES.

Filled with No. 1 Rose, Wintergreen, or Phenated Tooth-Powder.

Per half-gross	$10.00
" dozen	2.00
Each	.25

TOOTH-SOAPS.



Composed of the purest white soap, cocoanut oil, English precipitated chalk, orris root, white sugar, and aromatics, warranted of the best quality. These are so skillfully combined that, while the resulting dentifrice has all the cleansing properties of the best soaps, the peculiar soapy taste is completely masked. We have three flavors,—

MINT, WINTERGREEN, ROSE,

experience having demonstrated that these leave the most agreeable taste in the mouth after use.

Put up in cakes 2½ inches long, 1⅜ inches wide, and ⅝-inch thick, and inclosed in a neat decorated box. Each cake, as a guarantee of quality, is stamped on the top with the name "S. S. White Dental Mfg. Co.," and name of the flavor on the bottom.

	Per gross.	Per doz.	Per cake.
Price, Mint or Wintergreen................	$21.00	$2.00	$0.25
" Rose..............................	27.00	2.50	.30

PRECIPITATED CHALK.

Half-Pound Rice-Paper Bags, Boxed.

We have been selling Precipitated Chalk well on to half a century, but never in so neat and convenient a form as now:

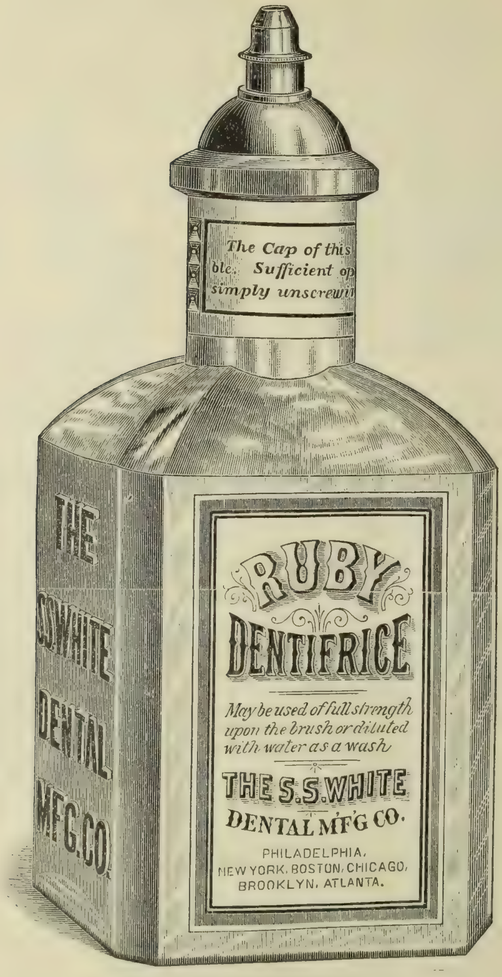
A rice-paper bag, holding a half-pound, in a neat paper box. Both bag and box sealed to prevent leakage. The box is covered with ornamental paper, gilt trimmed.

As to the contents: Precipitated Chalk is calcium carbonate in a state of molecular subdivision, and is, as a prominent dentist is in the habit of telling his patients, "the one substance which combines in itself all the elements of a perfect dentifrice. It is antacid, detergent, cleansing, and while not, strictly speaking, an antiseptic, the thorough cleansing which its use involves makes the whole mouth aseptic."

Fine as the finest tooth-powder, free from grit, with only the abrasiveness inherent to the calcium carbonate, which is too little to injure enamel while it will cleanse thoroughly.

Price in half-pound boxes..............................per box $0.15

RUBY MOUTH-WASH.


The Cap of this
ble. Sufficient op
simply unscrewin
THE S.S.WHITE DENTAL MFG.CO.
RUBY
DENTIFRICE
May be used of full strength upon the brush or diluted with water as a wash
THE S.S.WHITE
DENTAL M'F'G CO.
PHILADELPHIA,
NEW YORK, BOSTON, CHICAGO,
BROOKLYN, ATLANTA.

This preparation is an improvement on a celebrated French mouth-wash which has acquired an extensive sale throughout European countries. We think it will be admitted to be the most delightful toilet article on the market. It is highly but delicately perfumed, without astringency or bitterness, although so concentrated that a few drops in a half-tumblerful of water are sufficient to make a delicious, fragrant perfume, which leaves a persistent, agreeable sense of cleanliness in the mouth.

Put up in 4-oz. Bottles, with patent sprinkler top, each Bottle in a neatly ornamented Box.

Price..	per gross	$84.00
“	per dozen	7.50
“	per bottle	.75

LAUREL MOUTH-WASH.

Formula by Dr. F. A. Coney.

DR. F. A. CONEY'S
LAUREL
MOUTH
WASH.
May be used of full strength upon the Brush or diluted with Water as a Wash
THE S.S.WHITE DENTAL MFG CO

The definite object aimed at in compounding Laurel Mouth-Wash was to provide a help to its author in the treatment of pyorrhea. It has been such a help for years. It has helped others in the same way.

Its special purpose was as a wash after surgical treatment for pyorrhea. So used two or three times a day, a week or so would see the gum firm and healthy, of good color, closely embracing the necks of the teeth.

It is a local tonic for mucous tissue. Turgid gums which bleed at a touch become hard and firm under its application.

Besides its therapeutic value, it is an agreeable toilet mouth-wash for ordinary, every-day use, where its tonicity for the mucous membrane exercises a prophylactic influence.

Put up in 4-oz. bottles with crown sprinkler stopper.

Price..	per dozen $4.00
"	per bottle .40

MOUTH-WASHES.

BOUQUET.

An elegant and delightful toilet article for daily use by those whose mouths are in a healthy condition and needing no special medication. It leaves a persistent fragrance upon the breath.

Put up in 6-oz. Bottles, Glass Stoppers.

Price	per gross	$84.00
"	per dozen	7.50
"	per bottle	.75

SALICYLIC ACID.

Salicylic Acid possesses remarkable properties as a disinfectant and deodorizer. Being without smell or taste, it advantageously replaces carbolic acid, to which in the respects alluded to it is highly preferable. It has been employed successfully in the form of a mouth-wash or gargle in stomatitis, and in scorbutic or aphthous conditions of the mouth and gums, and is believed to be very efficacious in the destruction of oral parasites, and generally efficient in the treatment of morbid conditions of the gums and mucous membrane. The Mouth-Wash contains Salicylic Acid in full proportion, according to an approved formula.

Put up in 6-oz. Bottles.

Price	per gross	$57.00
"	per dozen	5.00
"	per bottle	.50

FLORENTINE.

A wash for daily use. Adapted to the average taste of old and young.

It has a slight pungent, aromatic flavor, a very mild astringency, and leaves a grateful sense of stimulation to the gums and mucous membrane.

Put up in 3½-oz. Bottles.

Price	per gross	$37.50
"	per dozen	3.50
"	per bottle	.35

ORALINA.

This is an agreeable preparation, intended for daily use as a toilet article, for cleansing the mouth and teeth and imparting a pleasant fragrance to the breath. It is slightly stimulant, astringent, and antacid, though not to an extent which would make it objectionable. It is not, therefore, recommended as possessing medicinal qualities adapting it to diseased conditions of the mouth or gums, but simply as a wholesale detergent for general employment. It may be used freely on the brush or diluted with water as a mouth-wash. It is warranted to contain nothing injurious to the teeth.

Put up in 4-oz. Bottles.

Price	per gross	$37.50
"	per dozen	3.50
"	per bottle	.35

MOUTH-WASHES.

SAPONACEOUS.

A detergent, antacid preparation, containing a large proportion of castile-soap, and intended for daily use in cleansing the mouth and teeth.

Put up in 4-oz. Bottles.

Price	per gross	$33.00
“	per dozen	3.00
“	per bottle	.30

ASTRINGENT.

An agreeable and useful wash, combining anodyne, astringent, disinfectant, detergent, tonic, and styptic properties.

Put up in 3-oz. Bottles.

Price	per gross	$33.00
“	per dozen	3.00
“	per bottle	.30

Put up in 16-oz. Bottles.

Price	each	$1.25

TEABERRY.

A detergent and stimulant wash, the teaberry flavor predominating.

Put up in 2-oz. Bottles.

Price	per gross	$23.00
“	per dozen	2.25
“	per bottle	.25

SEABURY'S ASTRINGENT GUM WASH

Is a saturated solution of White Oak Bark, carefully prepared, and is intended to be used to allay any inflammation of the mucous membrane.

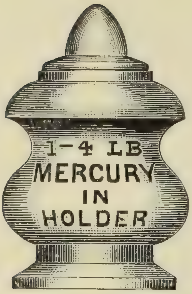
It is a standard preparation, and may be used as a gargle, full strength, without any ill effects.

Price,	12-oz. Bottle, per bottle	$1.00	per doz.	$9.00
“	6-oz. “ “ “	.50	“	4.50
“	2-gallon Jugs		each	9.00

COLOGNES.

Ordinary	Cologne,	pint bottles	per bottle	$1.00
Bouquet	“	12-oz. glass-stoppered bottles	“	1.50
Oriental	“	12-oz. “ “	“	1.75

MERCURY.



¼ Pound in Wood Holder.

¼ Pound in Bottle.

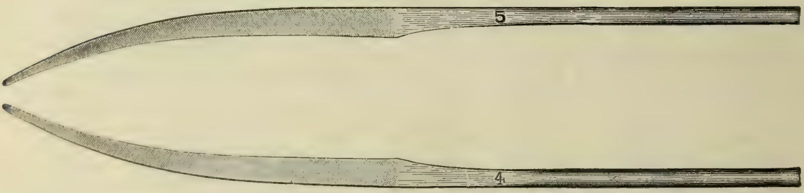
We sell the best re-distilled mercury only, specially prepared by a thoroughly responsible manufacturing chemist. Put up in quarter-pound bottles or holders, each bearing our trade-mark and labeled. For safety in transportation we place each bottle in a turned wood box, sufficiently secured to prevent damage to other goods.

PRICES.

Per bottle..$0.50
¼ pound in Holder... .50

ADVANCE IN PRICE.

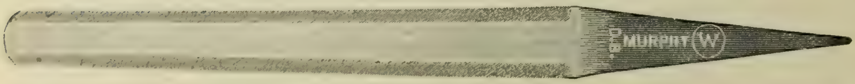
Dr. Meriam's Right and Left Plug-Finishing Files.



Price.................................each $0.20; per doz. $2.40

ADVANCE IN PRICE.

SERRATING FILES.



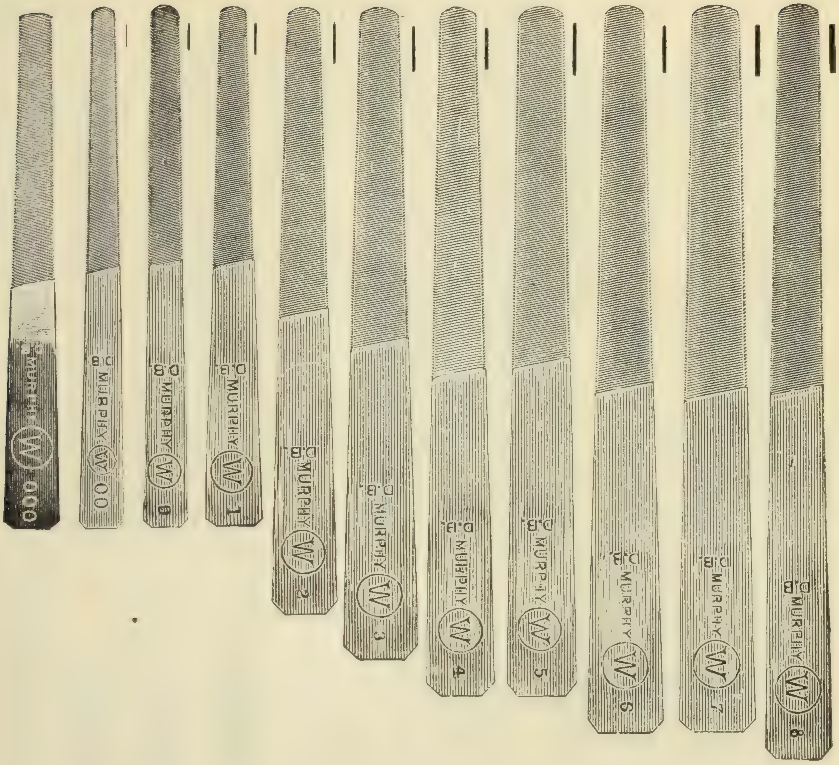
Not intended for making serrations in instruments, but for cleaning and sharpening those already made.

These Files are very thin; both edges are double-beveled, cut very fine, and may be used on the finest serrated points.

Price.................................each $0.30; per doz. $3.60

MURPHY'S FILES.

Separating.



The Murphy Separating Files afford a wide range of sizes and cuts, from the almost polishing face of No. 000 to No. 8, eleven sizes in all, with almost as great a range in cut of working surface. The finer files are almost mere lines in thickness; the coarser ones are perceptibly heavier. Some of them are cut on both sides, some on only one, as indicated below.

In the regular line, Nos. 000 to 4 and 6 have one safe side; Nos. 5, 7, and 8 are cut all over. All have the push-cut. Put up in dozen packages containing one of each number separate, or assorted.

PRICE.

Push-cut	No. 000	each, $0.12;	per doz. $1.25
"	Nos. 00 to 8	" .10;	" " 1.00
"	Assorted		" " 1.00

ADVANCE IN PRICE.

DRAW-CUT MURPHY SEPARATING FILES.

For very exact work, Nos. 00 and 0 of the Murphy Separating Files are made with the draw-cut.

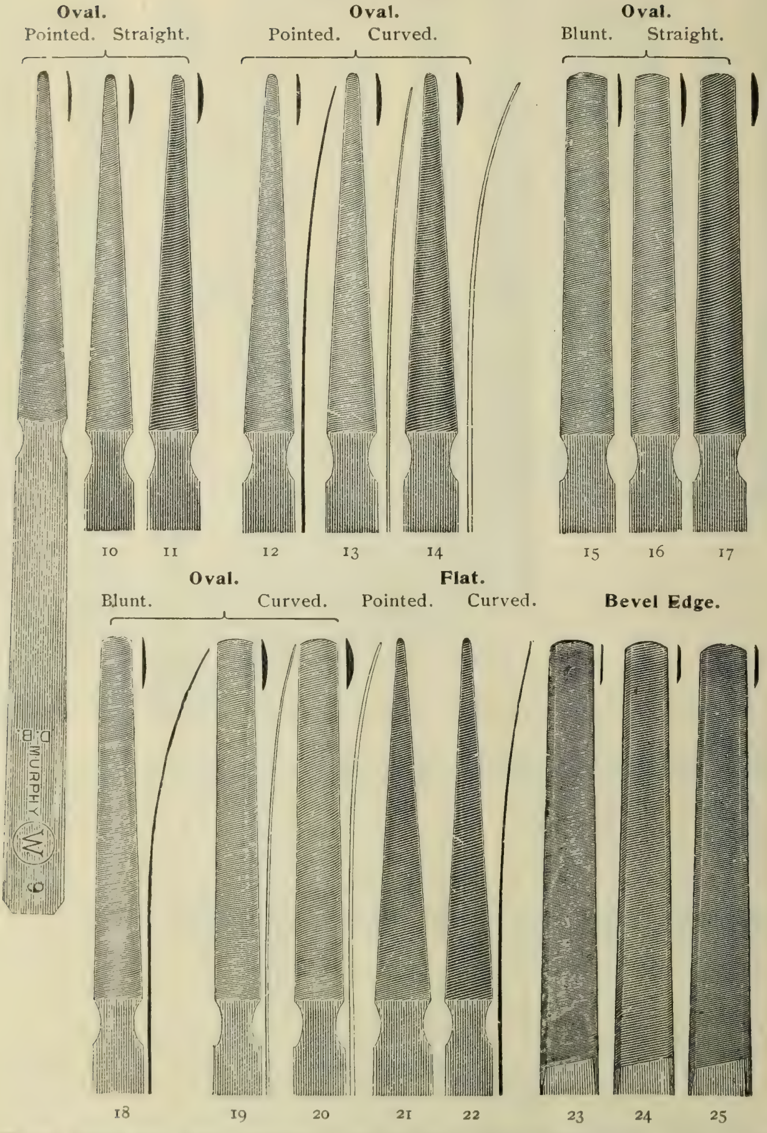
PRICE.

Draw-cut	Nos. 00 and 0	each, $0.13;	per doz. $1.50

ADVANCE IN PRICES.

MURPHY'S FILES.

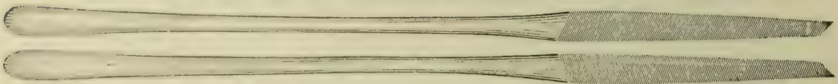
Plug-Finishing.



These Files run thin, medium, and thick, and fine, medium, and coarse-cut.

Price..................................each $0.18; per doz. $2.00

DR. TAFT'S PLUG-FINISHING FILES.

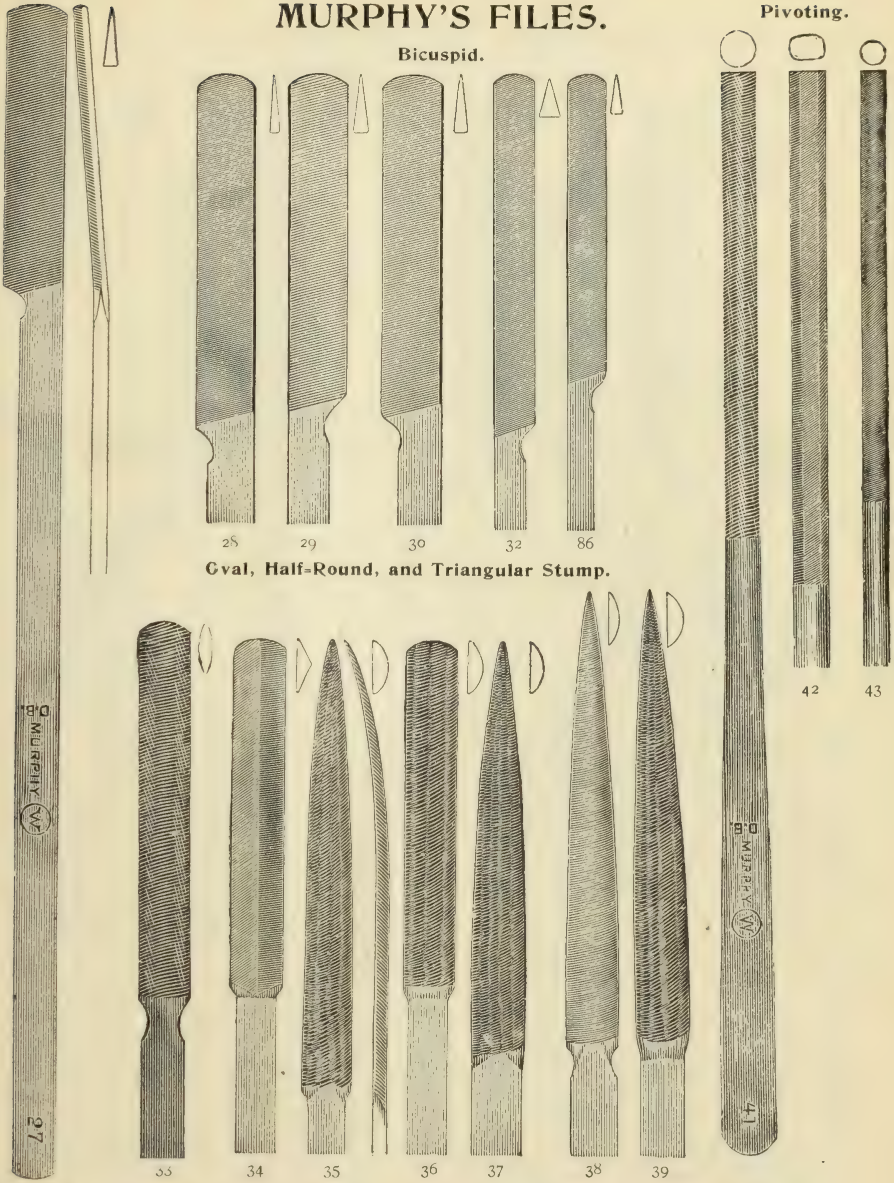


A small, delicate File, with spring temper, designed for dressing down fillings in approximal cavities. Right and left, either push- or pull-cut.

Price, Push-Cut or Regular.................each $0.13; per doz. $1.50
" Pull-Cut .... " .13; " 1.50
" Oval .... " .13; " 1.50

ADVANCE IN PRICES.

MURPHY'S FILES.



Bicuspid.

Pivoting.

Oval, Half-Round, and Triangular Stump.

Bicuspid. Nos. 27, 28, 29, 30, 32, 86, are rights and lefts, cut inside, outside, and all over. No. 27 is bent; No. 28 is thin and fine-cut; No. 29, medium and medium-cut; No. 30, thick and coarse-cut; No. 32, extra thick; No. 86, narrow and medium-cut.

Stump. No. 33, oval, one safe side and cut all over; No. 34, triangular, cut all over; No. 35, half oval, pointed, curved, cut all over; No. 36, half oval, blunt, cut all over; No. 37, half oval, thin, pointed, fine-cut all over; No. 38, half oval, pointed, medium-cut all over; No. 39, half oval, thick, coarse-cut all over.

Pivoting. No. 41, round, coarse-cut; No. 42, oval, medium-cut; No. 43, round, small, fine-cut.

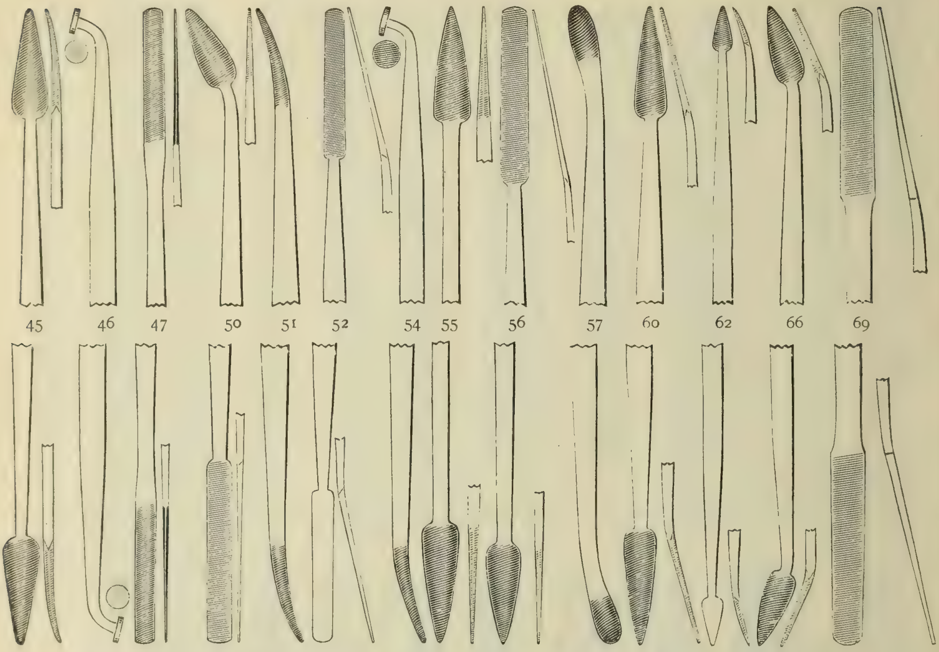
PRICES.

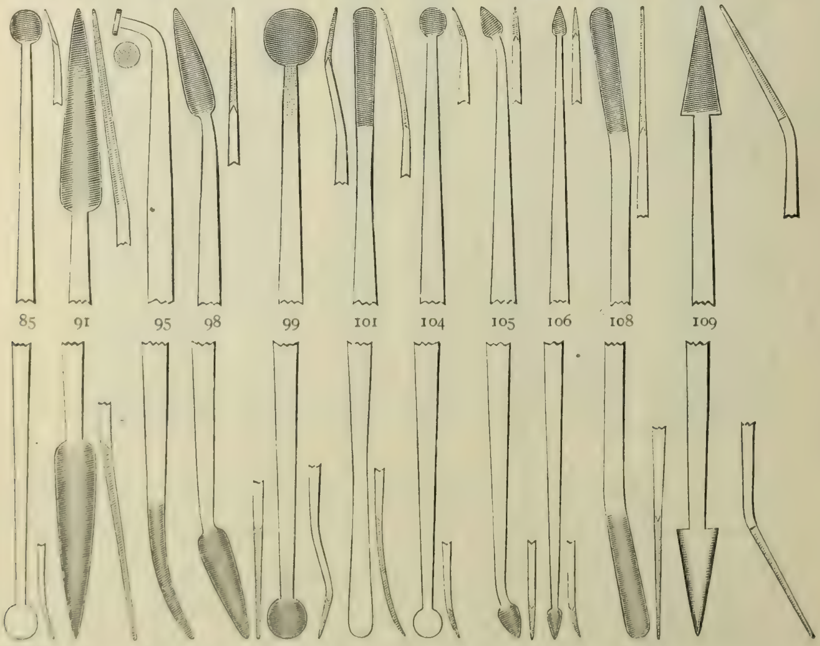
Bicuspid, Stump, and Pivoting Files......each $0.20; per doz. $2.40

ADVANCE IN PRICES.

MURPHY'S FILES.

Double-End Plug-Finishing, for Lateral and Crown Cavities.



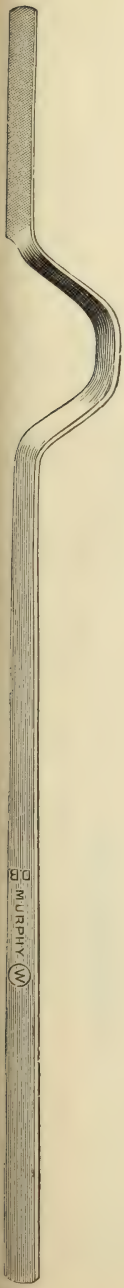


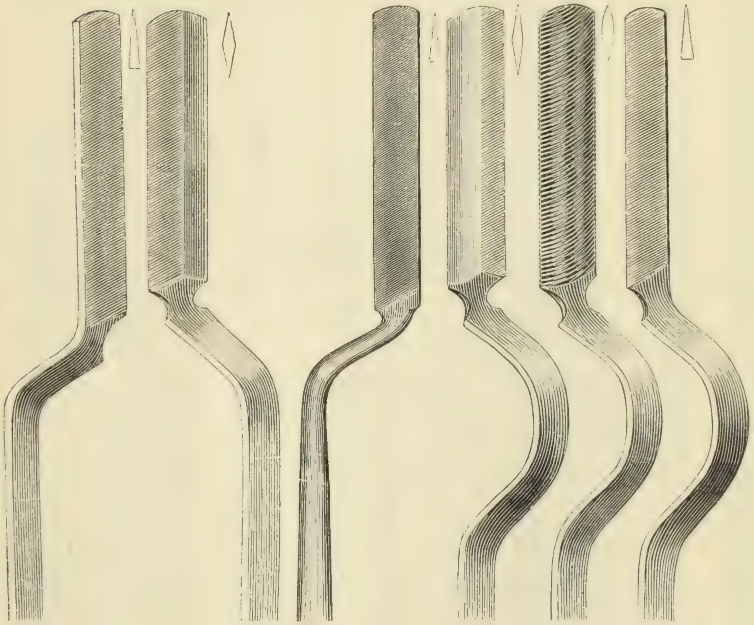
There is perhaps not a place in the mouth which cannot be reached for plug-finishing purposes with some one of the forms of Files shown here.

Price....................................each $0.23; per doz. $2.75

MURPHY'S FILES.

Single and Double Curve Molar.





These Files are made cut inside, outside, or all over. In ordering, state cut wanted; whether for the right or left side of the mouth; upper or lower jaw.

PRICES.

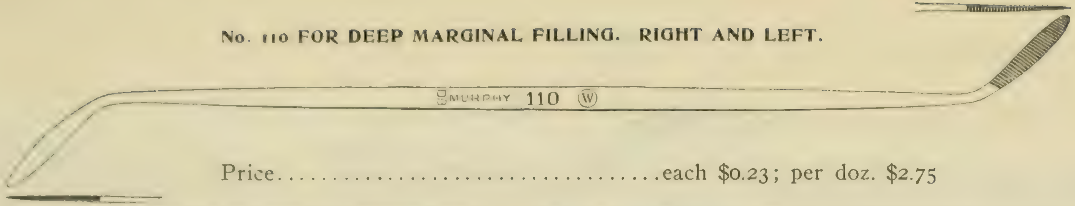
No. 78.	Single Curve,	Knife Edge,	each $0.20;	per doz.	$2.40
" 87.	"	Feather Edge	" .25;	"	2.75
" 107.	"	Knife Edge	" .25;	"	2.75
" 80.	Double Curve,	Feather Edge	" .30;	"	3.50
" 81.	"	Oval Face	" .30;	"	3.50
" 84.	"	Knife Edge	" .25;	"	2.75
" 115.	Double Curve, Knife Edge. Light and delicate in form (pattern supplied by Dr. J. T. Cazier), so that it can frequently be used in operations for which the ordinary bicuspid and molar files are too heavy,		each $0.25;	per doz.	2.75

ADVANCE IN PRICES.

MURPHY'S FILES.

Contour Plug-Finishing.

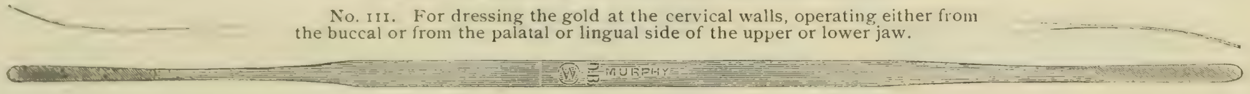
No. 110 FOR DEEP MARGINAL FILLING. RIGHT AND LEFT.



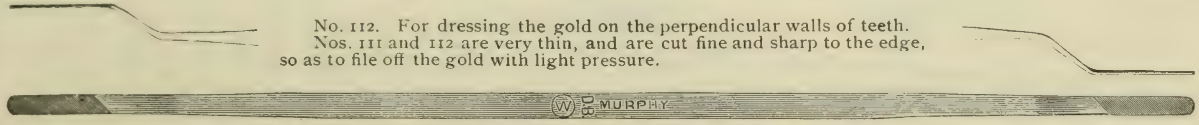
Price.................................each $0.23; per doz. $2.75

DR. J. T. CAZIER'S PATTERNS. Nos. 111 and 112.

No. 111. For dressing the gold at the cervical walls, operating either from the buccal or from the palatal or lingual side of the upper or lower jaw.

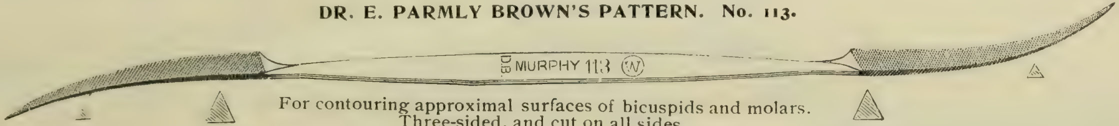


No. 112. For dressing the gold on the perpendicular walls of teeth. Nos. 111 and 112 are very thin, and are cut fine and sharp to the edge, so as to file off the gold with light pressure.



Price.................................each $0.23; per doz. $2.75

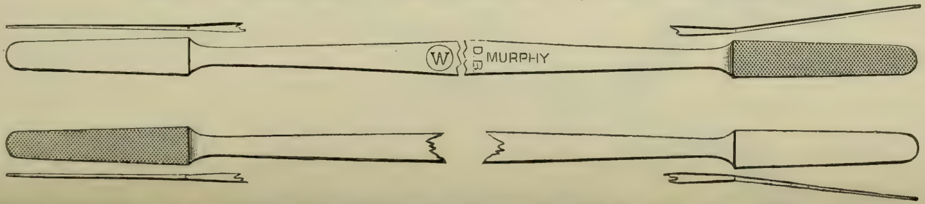
DR. E. PARMLY BROWN'S PATTERN. No. 113.



For contouring approximal surfaces of bicuspids and molars. Three-sided, and cut on all sides.

Price.................................each $0.30; per doz. $3.50

DR. A. L. NORTHROP'S PATTERN. No. 114, RIGHT AND LEFT.



These Double-End Right and Left Files, beveled on the smooth side, making sharp, thin edges, are very finely cut.
Price ....each $0.23; per doz. $2.75

The finishing of contour fillings requires special forms of Files to afford extreme nicety of manipulation. The line here shown embodies the ideas of some of the best-known operators.

ADVANCE IN PRICES.

MURPHY'S FILES FOR VULCANITE WORK.

A.—Half-Round, with Tang for Wood Handle.

The illustration (A) shows the smallest, 4½ inch, full size.

Price,	A,	4½	inch,	each	$0.18;	per	doz.	$2.00
"	"	5¼	"	"	.22;	"	"	2.50
"	"	6	"	"	.25;	"	"	2.75

Half-Round, with Scraper Point and with Tang for Wood Handle.

The same as the A Files, except that the point is bent at a sharp angle to form a scraper (see illustration Aa).

Price,	4½	inch,	each	$0.22;	per	doz.	$2.50
"	5¼	"	"	.25;	"	"	2.75
"	6	"	"	.26;	"	"	3.00

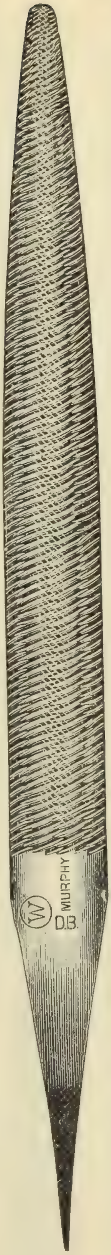
Half-Round, Steel Handle.

Much like the A Files, except that the tang is lengthened out and finished to form a hand-hold.

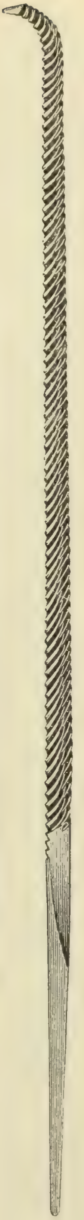
Price,	4½	inch,	each	$0.22;	per	doz.	$2.50
"	5¼	"	"	.24;	"	"	2.60
"	6	"	"	.26;	"	"	3.00

For the Murphy Vulcanite Files there are these two special points to be considered all the time. The File-cuts are uniform and run in straight lines. They do not wander around aimlessly, getting lost or mixed up with one another, but each series is carried distinctly in a straight line from shoulder to point. These two characteristics are what make them cut so well.

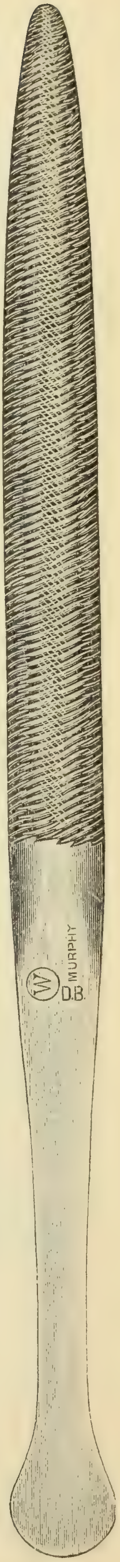
The reverse sides of the Murphy half-round and oval Vulcanite Files are cut just as perfectly as are the faces shown.



A



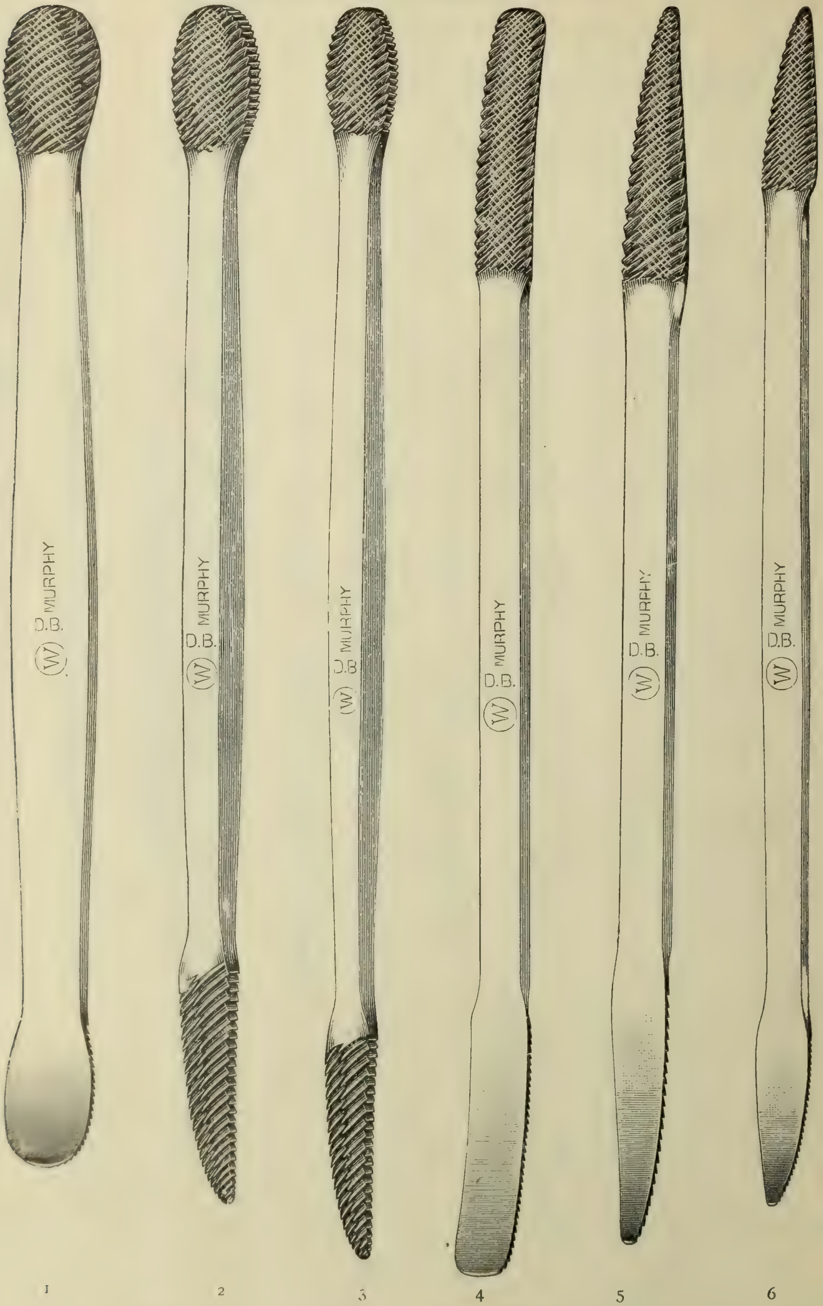
Aa



ADVANCE IN PRICES.

MURPHY'S FILES FOR VULCANITE WORK.

The Cuts show the Forms of these Files.



Nos. 1, 4, 5, and 6 are cut on one side of each end.
" 2 and 3 are cut on all sides of the end.
" 1, 4, 5, and 6 are half oval.
" 2 and 3 are full oval.

Price..each $0.25; per doz. $2.75

ADVANCE IN PRICES.

MURPHY'S FILES FOR VULCANITE WORK.

DOUBLE END, HALF-ROUND.

The illustration "B" gives a full size view of B 7-in. File.

7-in., price	.... each	$0.26;	doz. $3.00
8 " "	.... "	.30;	" 3.50
9 " "	.... "	.32;	" 3.75

C. DOUBLE END, OVAL.

Known also as Fish-belly.

The illustration "C" gives a full size view of the 7-in. File.

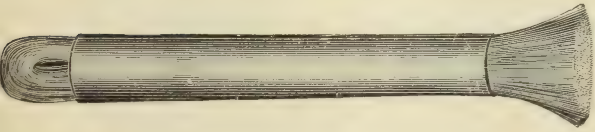
7-in., price	.... each	$0.32;	doz. $3.75
8 " "	.... "	.35;	" 4.00
9 " "	.... "	.40;	" 4.50

Round Vulcanite Files, known as RAT-TAIL.

4-in., price	.... each	$0.18;	doz. $2.00
5 " "	.... "	.20;	" 2.25
6 " "	.... "	.22;	" 2.50

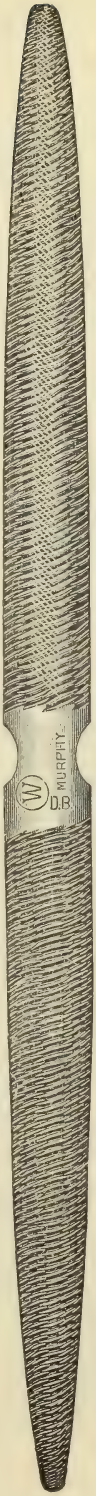
FLEXIBLE STEEL SCRATCH BRUSH.

Suggested by DR. T. M. HUNTER.

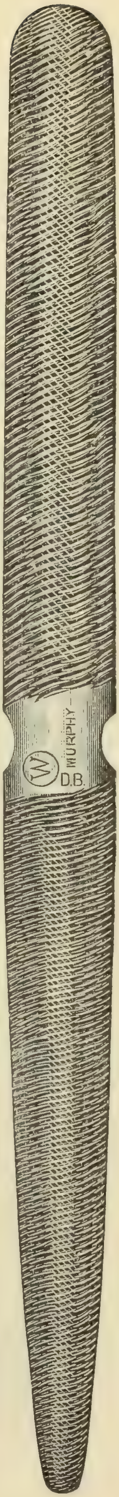


A flexible steel wire Brush for the removal of silex and very small globules of rubber from the palatine surfaces of rubber plates. It may also be used, held firmly, to follow the scraper in smoothing up all the polished parts. The wires can be trimmed with plate shears whenever dull or bent.

Price $0.25



B



C

Porcelain Teeth

FOR

PARTIAL DENTURES—UPPER AND LOWER.

UPPERS.—When the only missing teeth in the front of the mouth are the central incisors, a gum section of the two is advantageous. It dispenses with a joint, which sometimes forms an objectionable seam, and the piece is somewhat stronger than if two teeth were used. We illustrate some forty examples of blocks of this character, embracing a wide range of forms and sizes, with varying lengths of bite and ridge-lap, and different lengths and thicknesses of gum.

Another form of partial restoration occasionally required is where both centrals and the lateral on one side are missing. We provide for these by sections containing both centrals and one or the other lateral. These sections are in pairs. Thus, No. 1 and No. 2 are alike as to the centrals, but No. 1 contains the right lateral, and No. 2 the left. Nos. 3 and 4, 5 and 6, 7 and 8, 9 and 10, and 11 and 12 are also paired, the left lateral being on one and the right on the other of each pair. The curve of the gum-margin and the profile view, showing the ridge-lap and bite, are also illustrated.

Following these are illustrations of sections of four teeth,—both centrals and both laterals,—in one block. The illustrations give a very good idea of the widths and lengths of tooth and gum and of the varying curves of the incisor edges.

LOWERS.—Many cases are found in which the molars and often the second, sometimes also the first bicuspid, have been extracted. In such cases, after complete absorption of the gum has been established, we have a condition represented by Fig. 1. To restore this portion of the jaw to usefulness in mastication, the single sections Nos. 1 to 8 are well adapted. The sizes and shapes of a great many human jaws in this locality vary comparatively little after complete absorption of the gum, no matter how much they may have differed when in their normal condition. Consequently, a small range of forms and sizes suffices for the needs, and in probably the majority of instances but little grinding will be necessary to make a perfect fit.

In another class of cases, where the back teeth have been long lost, while the front ones have only recently been extracted, we have the complete absorption toward the angle of the jaw, and a comparatively full maxillary ridge in front. The condition, and the kinds of teeth required to overcome it, are shown in Fig. 2. In the set numbered 31, the incisor sections are gumless. As a section these gumless teeth are somewhat stronger than if they were single, especially if the case is one which will not permit of the rubber extending under the heel of the section.

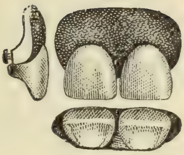
Some cases will be found where the maxillary ridge has been absorbed so much that the molar and bicuspid sections of No. 31 will be too short. In such event, No. 76 lower single gum rubber may be used, or any of the molar and bicuspid sections numbered 1, 2, 3, 4, 5, 6, 7, or 8, with single lower plain rubber incisors.

THE S. S. WHITE DENTAL MANUFACTURING CO.

CHART OF GUM SECTIONS, PARTIAL.

Upper, Sets of 2 in One Section.

1



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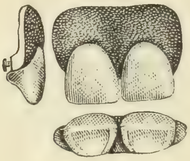

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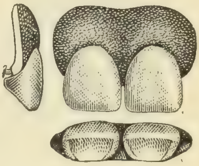

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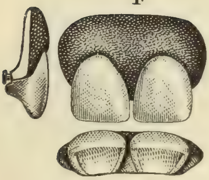

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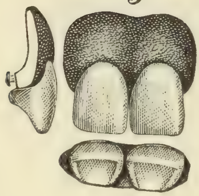

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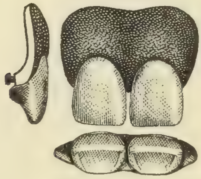

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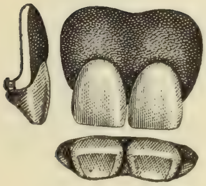

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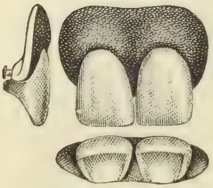

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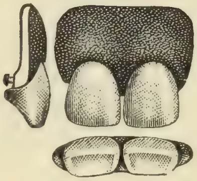

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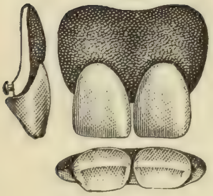

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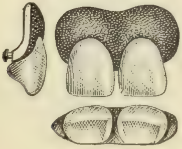

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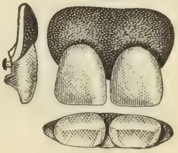

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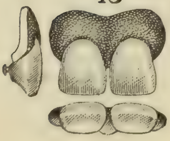

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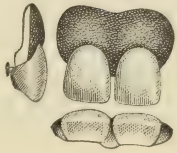

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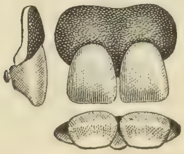
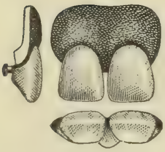


CHART OF GUM SECTIONS, PARTIAL.

Upper, Sets of 2 in One Section.

16



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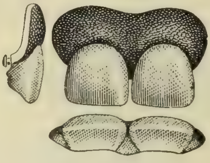

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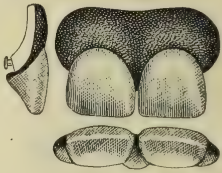

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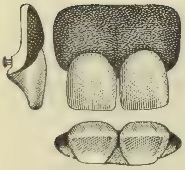

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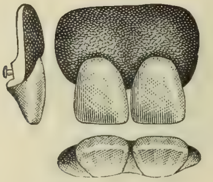

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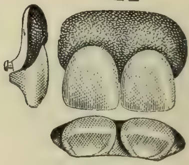

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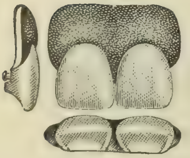

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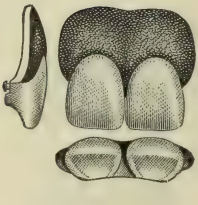

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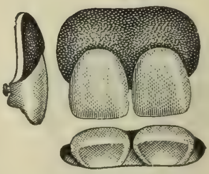

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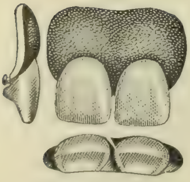

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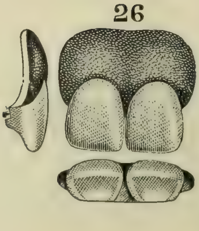

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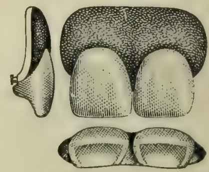

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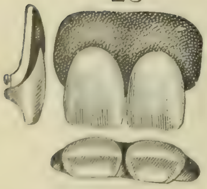

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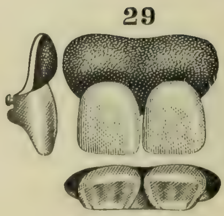

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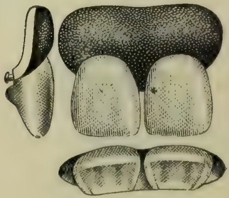
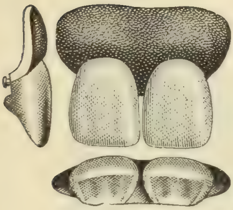


CHART OF GUM SECTIONS, PARTIAL.

Upper, Sets of 2 in One Section.

31



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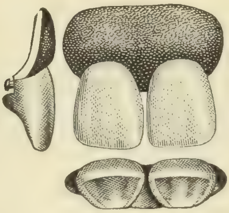

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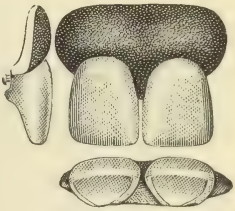

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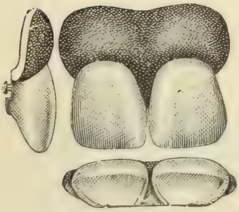

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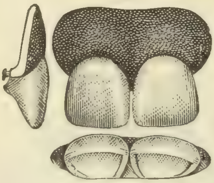

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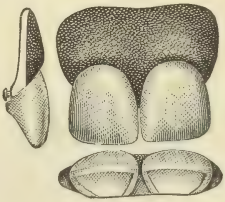

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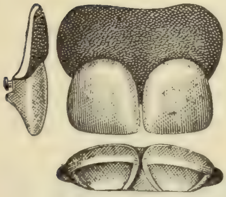

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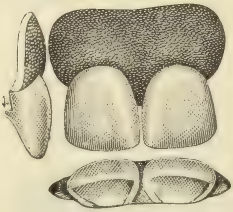

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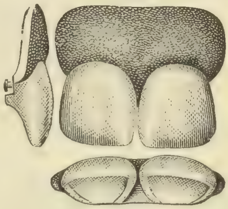

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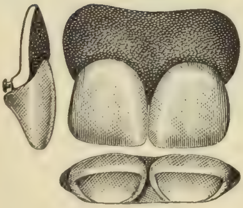

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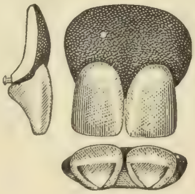

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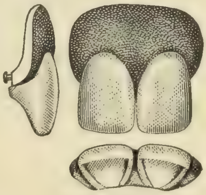

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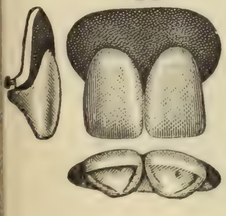

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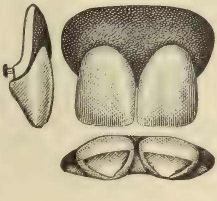

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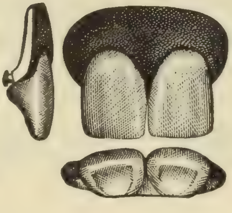

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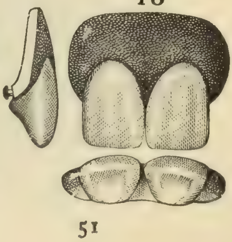
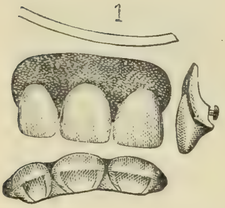


CHART OF GUM SECTIONS, PARTIAL.

Upper, Sets of 3 (Centrals and Lateral), in One Section.

1



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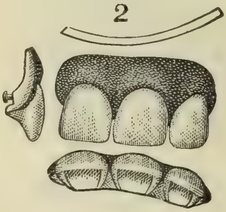

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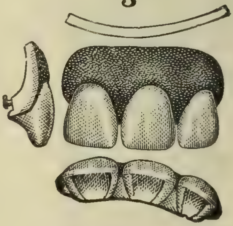

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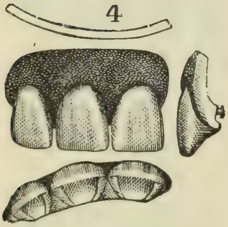

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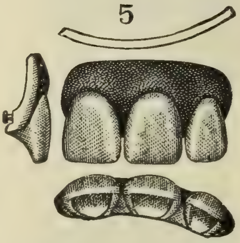

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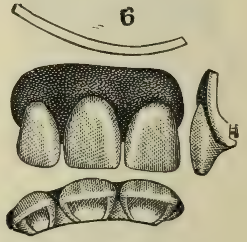

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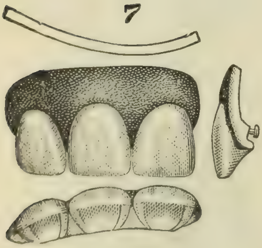

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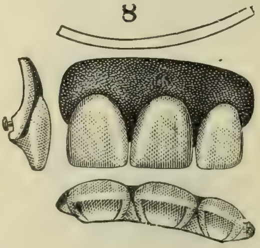

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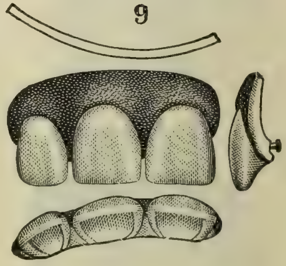

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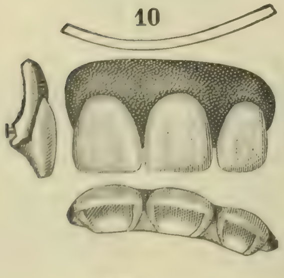

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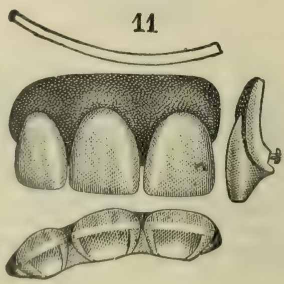

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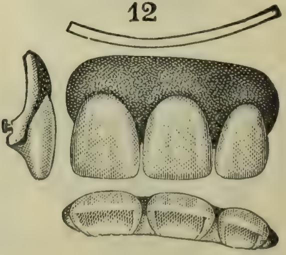
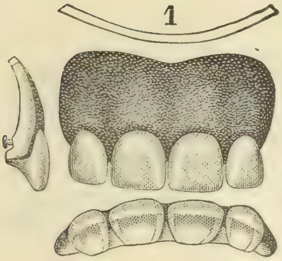


THE S. S. WHITE DENTAL MANUFACTURING CO.

CHART OF GUM SECTIONS, PARTIAL.

Upper, Sets of 4, in One Section.

1



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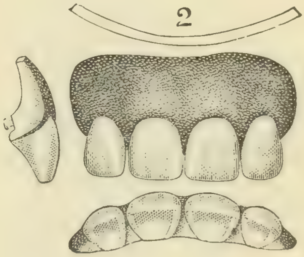

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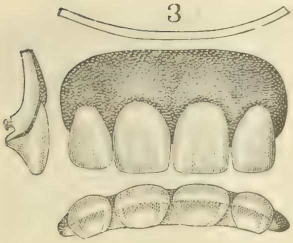

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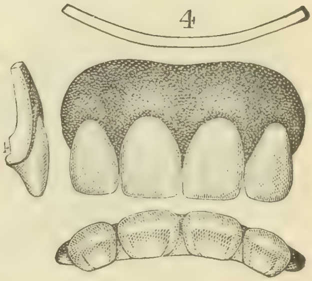

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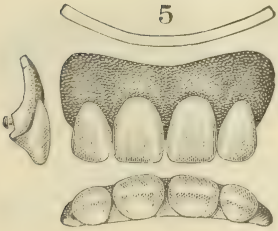

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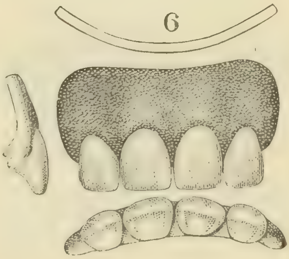

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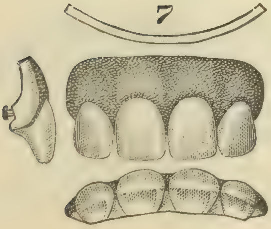

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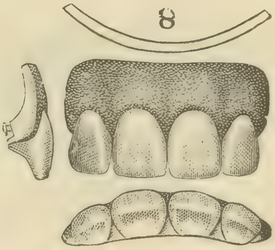
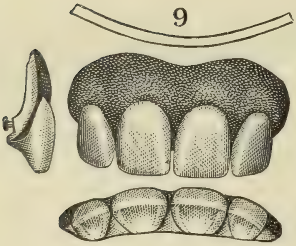


THE S. S. WHITE DENTAL MANUFACTURING CO.

CHART OF GUM SECTIONS, PARTIAL.

Upper, Sets of 4, in One Section.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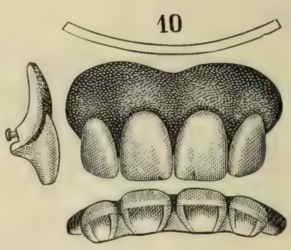
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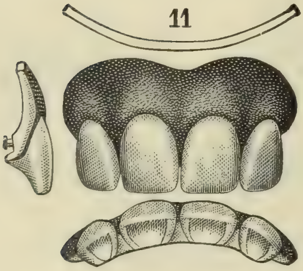
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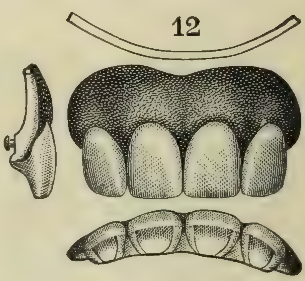
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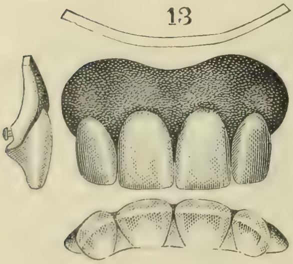
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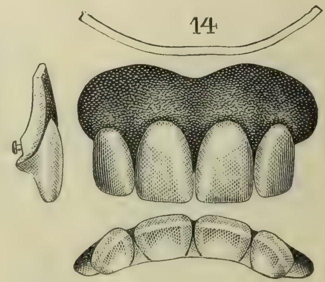
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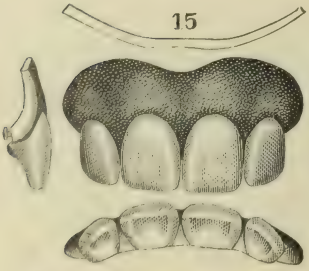
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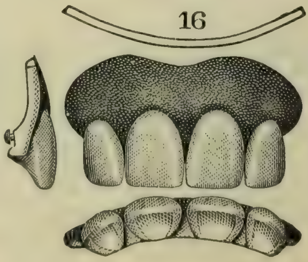
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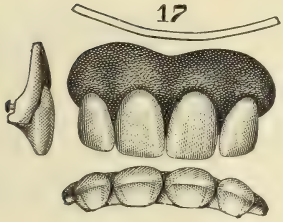
CHART OF GUM SECTIONS, PARTIAL.

Upper, Sets of 4, in One Section.

17



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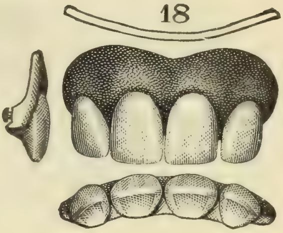

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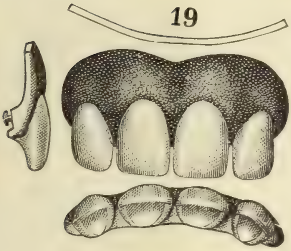

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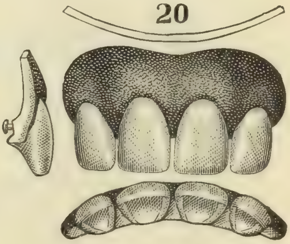

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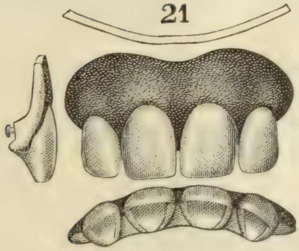

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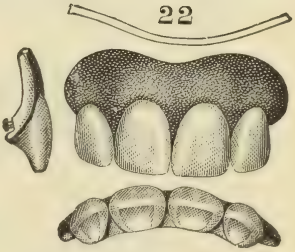

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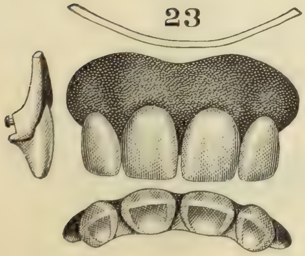

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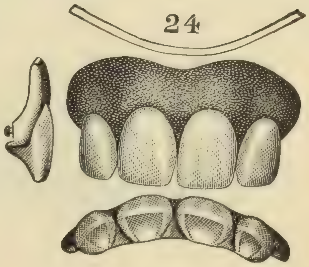
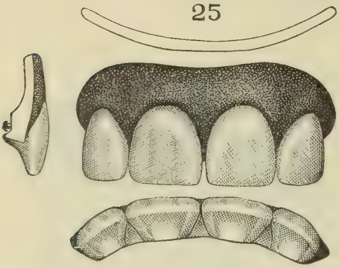


THE S. S. WHITE DENTAL MANUFACTURING CO.

CHART OF GUM SECTIONS, PARTIAL.

Upper, Sets of 4, in One Section.

25



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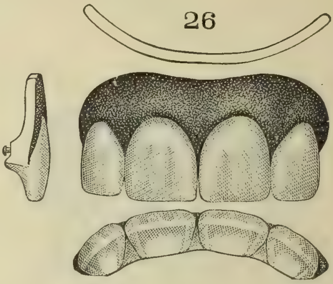

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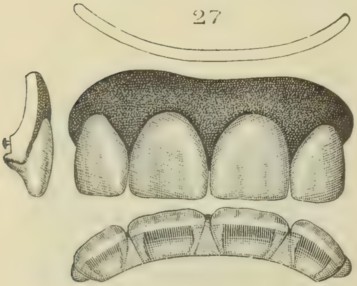

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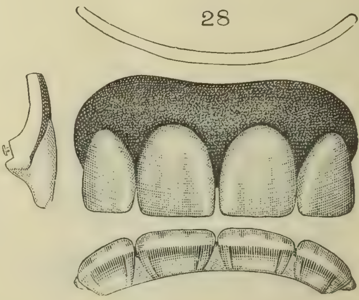
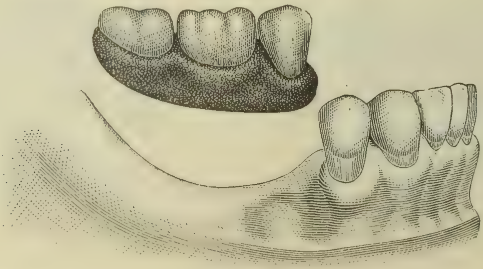


Lower, Sets of 6 (One Bicuspid and Two Molars), Two Sections, Right and Left.

FIG. 1.



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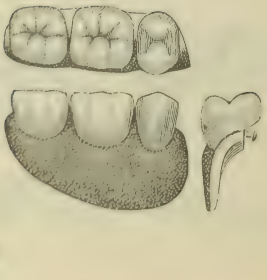

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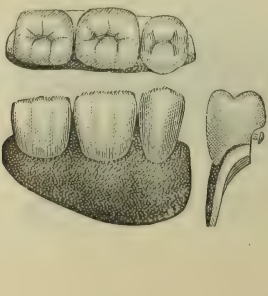
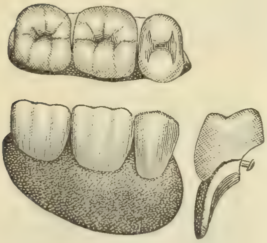


CHART OF GUM SECTIONS, PARTIAL.

Lower, Sets of 6 (One Bicuspid and Two Molars), Two Sections.

3



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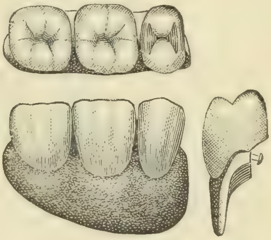

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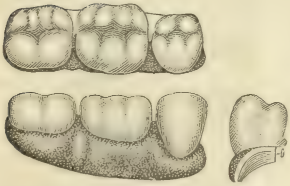

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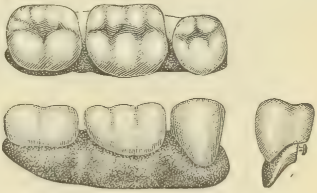

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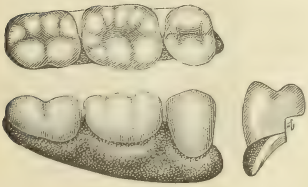

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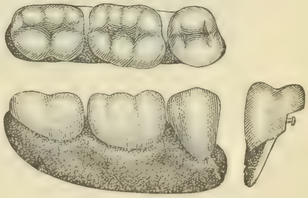
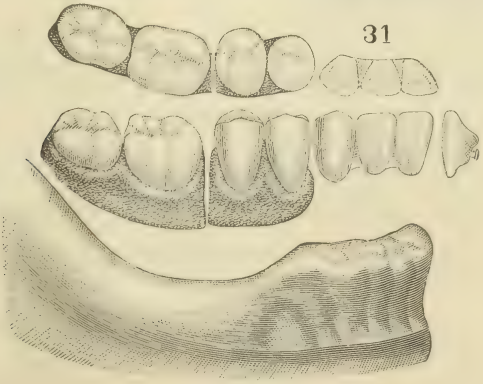


The cast, with the gum section, shows plainly its adaptation.

GUM SECTIONS, LOWER, SETS OF 14.

31

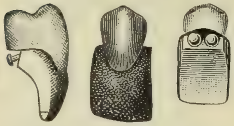


THE S. S. WHITE DENTAL MANUFACTURING CO.

CHART OF SINGLE GUM TEETH FOR RUBBER WORK.

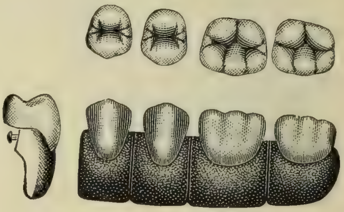
Lower, Bicuspids and Molars.

EACH CUT REPRESENTS THE HALF OF A SET OF EIGHT.



2

The above cuts show the approximal, buccal, and palatal faces of an Inferior Single Gum Rubber Bicuspid. The side view shows the position of the headed pins, the length of bite, and the curve.



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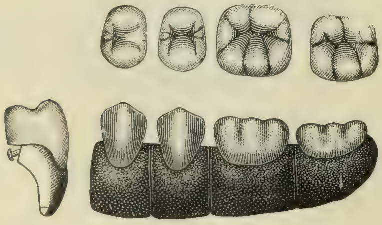

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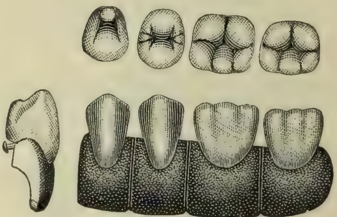

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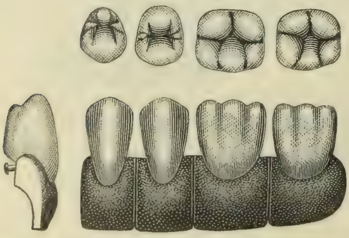


5

CHARLES ABBEY & SONS,

MANUFACTURERS OF

DENTISTS' FINE GOLD FOIL.

Nos. 228 and 230 Pear Street, Philadelphia.

The attention of Dentists is invited to our FINE GOLD FOIL, which is prepared under our constant personal supervision. Our Nos. are 4, 5, 6, and 8.

We are also manufacturing COHESIVE FINE GOLD FOIL, Nos. 4, 5, and 6.

ALL our GOLD FOIL is manufactured from ABSOLUTELY PURE GOLD, prepared expressly for the purpose, with great care, by ourselves.

ADDRESS **CHARLES ABBEY & SONS, Philadelphia.**

Wax Impression and Base=Plate Preparations.

The wax in our Impression and Base-Plate Preparations is genuine old-fashioned beeswax.

When we sell a preparation as "pure wax," we mean pure beeswax, unadulterated with "earth-wax," tallow, or any other cheapening ingredient. What we sell for "gutta-percha and wax" will be found on the application of the proper tests to be gutta-percha and beeswax, and nothing else. So with our paraffin (white or pink) and wax; paraffin and beeswax are there in due proportion, without foreign admixture.

In short, we sell just what the label indicates.

Should we ever find that earth-wax, tallow, etc., have any usefulness to dentists in the taking of impressions or the making of base-plates, we shall have business sagacity enough to put up preparations containing them and courage enough to announce the fact. So far, however, these things are "useful" only to unscrupulous manufacturers, who employ them without regard to their effect on the compounds with which they are incorporated, because they cheapen cost and so increase profits,—a practice about on a par, ethically, with selling "gutta-percha and wax" which has never a trace of gutta-percha.

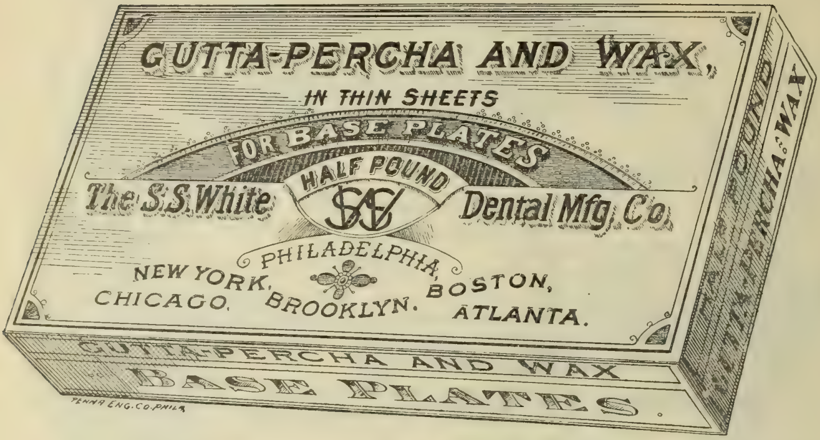
IMPRESSION WAX. In Half=Pound Boxes.

PRICES.

Yellow Wax, in Enameled Boxes....................	per box	$0.38
Gutta-percha and Wax..............................	"	.63
Pink Paraffin and Wax.............................	"	.50
White " " "	"	.50
White Wax..	"	.60

BASE-PLATE WAX.

PUT UP IN ENAMELED METAL BOXES.



Yellow Base-Plate Wax is put up in half-pound boxes containing sheets either 3¾ x 3⅛ or 5¾ x 3 inches. When ordering, please state which is preferred. Other Base-Plate Waxes are put up only in the oblong shape, 5¾ x 3 inches.

We would call special attention to our Gutta-Percha and Wax, which contains twenty per cent. of Gutta-Percha. All other makes, so far as brought to our notice, are merely colored to give the appearance of a Gutta-Percha compound.

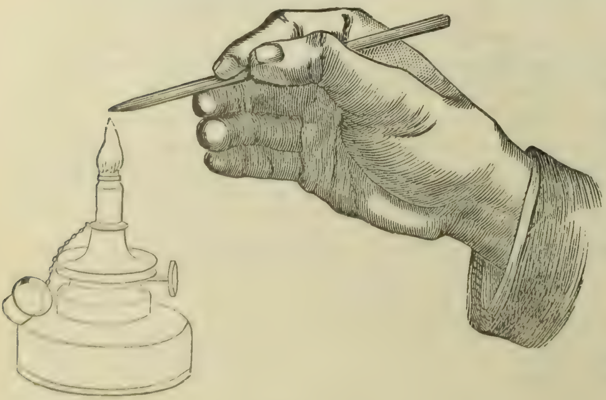
PRICE.

Yellow Wax	per box	$0.50
Gutta-Percha and Wax	"	.63
Pink Paraffin and Wax, Extra Tough	"	.50

EXTRA TOUGH PINK PARAFFIN AND WAX.

IN STICK FORM.

PUT UP IN ENAMELED METAL BOXES.

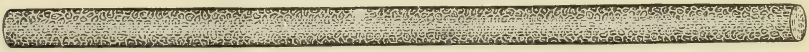


This Wax is put up in this convenient form for building up artificial dentures. It is prepared by an entirely original process, by which we are enabled to produce the toughest preparation ever offered.

Price, in half-pound boxes........................per box $0.50

CROWN STICKY WAX.

CROWN STICKY-WAX
MANUFACTURED BY
THE S. S. WHITE DENTAL MFG CO.
PHILADELPHIA.
NEW YORK, BOSTON, CHICAGO, BROOKLYN, ATLANTA,
ROCHESTER, BERLIN, BUENOS AIRES.
FACTORIES
TWELFTH ST. COR. CHESTNUT
211-217 SOUTH TWELFTH ST.
PHILADELPHIA.
TACKAWANNA & GILLINGHAM STS.
FRANKFORD
PRINCES BAY, STATEN ISLAND, N.Y.



Size and form of Sticks.

This wax preparation combines, in a superior degree, strength, stickiness, and clean cleavage from the plate or backing. It also has a very sharp fracture, enabling parts to be rejoined with exactness.

Made in round sticks as shown in the cut. Each stick is wrapped in foil, and by removing this only as fast as the Wax is used, there will be no inconvenience in handling it.

Crown Sticky Wax serves admirably in crown- and bridge-work, and for many other purposes in office and laboratory.

Put up in enameled tin boxes with hinged lid. This lid, when the box is open, serves as a tray to hold the stick which is being used, and which otherwise might get stuck to the table or work-bench.

Price..per box $0.50

DAINTY WAX.

Dainty Wax is first of all an Impression Wax. For taking impressions there is no essential point in which it is not at least equal to any other. It is a working wax, not an ornamental preparation. Try it and you will be conviced of its superiority in the practical points: Thus, it softens quickly in the heat of a small burner by the chair; kneads and pulls like chewing-gum; its surface can be "flown" without damage; it is extra tough, and takes an impression at least equal to any other means. Besides, it is beautiful in appearance; milk-white in color; cleanly to work; does not stick to the hands. To these elegancies, which rather enhance its practical value, it owes its name.

Dainty Wax is also excellent for taking bites, its characteristic toughness preventing the thin film between grinding-surfaces from being torn and displaced as is so frequently the case with other substances.

Put up in half-pound boxes.

Price, Dainty Wax..............................per box $0.60

WAXED CLOTH FOR BASE-PLATES.

Patented June 28, 1898. D. R. G. M. No. 97,461.

Waxed Cloth is Extra Tough Pink Paraffin and Wax reinforced with a sheet of Cloth on one side, the two being so attached that, while they can be separated without great difficulty, they are not at all likely to come apart in use.

The addition of the Cloth makes the Wax stiff and strong, and less liable to change form.

It saves the plaster cast from being injured by cutting through or overheating the wax when grinding on the teeth.

There is no need of coating the cast with collodion, as the Cloth side comes next to the plaster and separates from it easily.

It is preferable to gutta-percha for upper or lower plates. There is no crawling or shrinking when warmed by lamp or hot water for adjustment to the cast.

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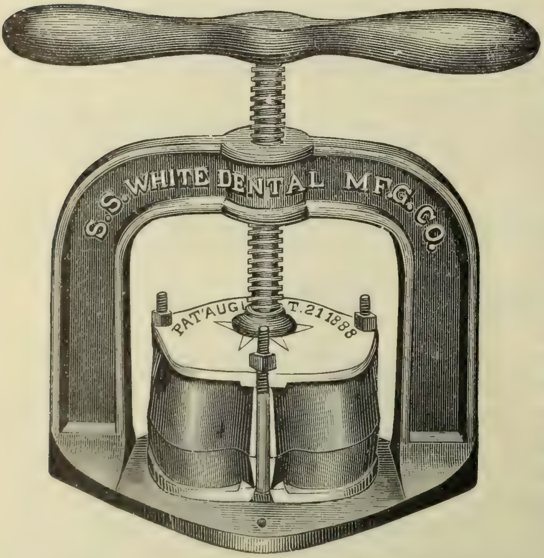
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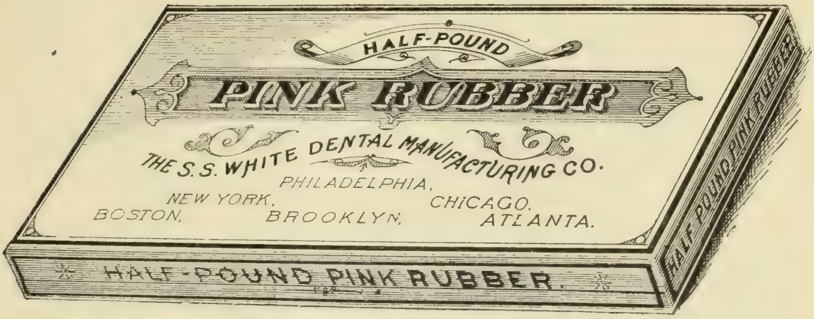

The appearance in the mouth of an artificial denture is only less important than its usefulness. If its artificiality is patent to every beholder, it fails in one of its most important objects. A good imitation of the natural gum is almost as essential in a vulcanite denture as a good articulation.

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Two shades, The S. S. White Dental Mfg. Co.'s Pink Rubber and The S. S. White Dental Mfg. Co.'s Pink Rubber "A," the latter a more delicate color than the former. Put up in half-pound boxes. If you have never tried this Rubber, send for a half-pound box. *Postage free* to United States and countries in the Parcels Post.

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" 10 " "	"	4.50

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This has retained its prominence among dentists during the last twenty-five years on account of its freedom from shrinkage or swelling, its fine grain, and its exceeding hardness and durability. It works very smoothly in the hand, becomes hard quite rapidly, and takes on a beautiful polish.

When others reduced the price of their amalgams and alloys, we should liked to have done the same, but the cost of its materials made it impossible. And yet its price is not exorbitant.

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We also publish our little book on "*The Teeth;*" for free distribution among patients. Price $3.50 per hundred. Sample 5 cents. It is made the more interesting by having each page repeated in phonetics.

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More than that—it possesses a strength unknown in other makes of rubber.

Making Pink Rubber is a peculiarly delicate operation, but we have reached a degree of perfection that we are justly proud of. We come as close to Nature as it seems possible for man to come.

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An examination of the make-up of SOZODONT by a professor of chemistry in one of our leading Universities discovered to him recently the applicability of the preparation to these conditions when used either alone as an injection, full strength, or as an adjuvant to more heroic measures in severe cases. This has been attested by numerous reports received from the dental profession at large. The stable alkalinity, astringency, and antiseptic properties of SOZODONT form a combination of characteristics for a wash in such cases that will not disappoint you if SOZODONT is faithfully and properly applied.

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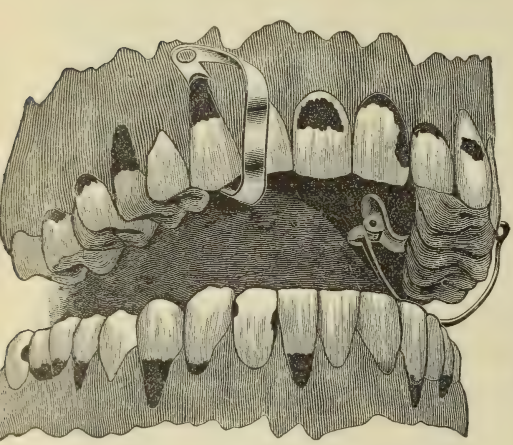
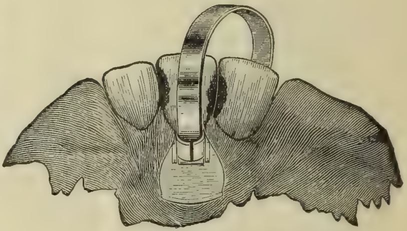
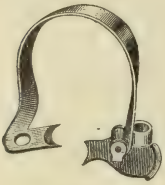
Libby's Cervix Clamps.

Patented January 1, 1895. Patented England, France, Germany, and Canada.





The Advantages Claimed for these Clamps:



1st. The inner arm is supplied with a pivoted shoe, rendering it painless.

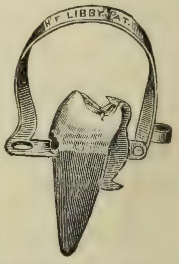
2d. The outer arm is thrown at an angle, allowing a free exposure of cervical and approximal cavities.

3d. The large sweep of the U-shaped bow admits the operator to every form of cavity with ease and comfort.

4th. In all its positions it is comparatively painless.

THE CLAMPS CAN BE APPLIED WITH EXISTING CLAMP FORCEPS.

Take no heed of the swivel pad. Place the outer clasping edge above the cavity, and the pad will adjust itself. Observe the position in cut on the bicuspid.


H. F. LIBBY PAT.

Showing the clamp in position on lower bicuspid.

TESTIMONIALS.

"I find the Libby Cervical Clamp a source of great comfort to myself and patients. It is easily applied and gives ample room for work."
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"I have used Libby Clamps for over a year with great success." C. N. Pierce, D.D.S., Portland, Maine.

"The Libby Clamp is all you claim. It is the only clamp of its kind that I use with ease for patient and success for the operation."
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"I have at last found a clamp that seems complete."
Dr. M. W. Pray, Boston, Mass.

"Would not exchange my Libby Clamp for any other that has ever been built. Have used all kinds, regardless of cost."
C. W. Clements, D.D.S., Manchester, N. H.

"I have used the Libby Cervix Clamp, and find it of great value."
Eugene H. Smith, D.M.D., Boston, Mass.

"Have used Libby Clamps in several severe cases, where no other would do the work, with great success. In hard and trying cases, where it seemed impossible to apply a clamp, the results have been wonderful. I cheerfully and heartily recommend them."
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"Best Cervical Clamp I have ever used; works very satisfactorily." W. E. Marden, D.D.S., Manchester, N.H.

"The Cervical Clamp of your design I find fills a much-needed want; its adaptation and wide range for the class of cavities for which designated being remarkable." Dr. C. L. Robinson, New York City.

"I have found the Libby Clamps a great comfort to me in all kinds of cervical cavities."
G. H. Peirce, D.D.S., Boston, Mass

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HENRY F. LIBBY.

Boston, Aug. 31, 1899.

"**Listerine** is the strongest and safest of the antiseptics which are available for the prophylactic treatment of the oral cavity."—*Miller.*

For the patient wearing bridge-work or artificial dentures, and as a daily wash for the preservation of the teeth, Listerine is freely prescribed by many successful practitioners, who are aware that too often the skill of the dentist is questioned when the real cause for dissatisfaction is due to the patient's negligence in properly caring for the teeth and mouth.

The sterilization of the teeth may be most nearly accomplished by using Listerine as a mouth-wash.

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H. D. NOBLE, D.D.S., Instructor in Orthodontia Technic.
——— ———, Demonstrator of Anatomy.

The 18th Session opened Monday, September 4, 1899, and will close May 31, 1900.

The next session will open Monday, September 3, 1900. No student can be admitted after September 13.

The examination for admission will be held at the college building, Friday and Saturday, August 31 and September 1, 1900.

REQUIREMENTS FOR ADMISSION.—A certificate of admission to the third year of a regular high school course (including one year's study of Latin) or an equivalent. Lists of studies accepted as equivalent will be furnished on application.

For further information and announcement, apply to

C. L. GODDARD, Dean,
406 Sutter Street,
SAN FRANCISCO, CAL.

Or the College of Dentistry, 1170 Market Street.

ESTABLISHED 1845.

Ohio College of Dental Surgery.

DEPARTMENT OF DENTISTRY—UNIVERSITY OF CINCINNATI.

Session 1899-1900.

FACULTY.

J. S. CASSIDY, A.M., M.D., D.D.S., Professor of Chemistry and Materia Medica.
H. A. SMITH, A.M., D.D.S., Dean of the Faculty, Professor of Operative Dentistry and Dental Pathology.
C. M. WRIGHT, A.M., D.D.S., Professor of Physiological and General Pathology.
WM. KNIGHT, M.D., D.D.S., Professor of Anatomy and Oral Surgery.
GRANT MOLYNEAUX, D.D.S., Professor of Prosthetic Dentistry and Metallurgy.
H. T. SMITH, D.D.S., Professor of Clinical Operative Dentistry and Orthodontia.
T. I. WAY, D.D.S., Professor of Dental Technics.

J. TAFT, M.D., D.D.S., Lecturer on Oral Hygiene.
C. I. KEELY, D.D.S., Lecturer on Orthodontia.
L. E. CUSTER, D.D.S., Lecturer on Anesthetics and Dental Electricity.
O. L. CAMERON, Lecturer on Bacteriology.

DEMONSTRATORS.

T. I. WAY, D.D.S., Superintendent of Clinics and of Instruction in Dental Technics.
E. A. MEHAFFEY, D.D.S., Demonstrator of Crown- and Bridge-work and Operative Dentistry.
C. P. McLAUGHLIN, D.D.S., Demonstrator of Operative Dentistry, Instructor in Extraction of Teeth.
C. A. PORTER, D.D.S., Demonstrator of Operative Dentistry.
R. W. TAYLOR, D.D.S., Demonstrator of Prosthetic Dentistry and Instructor in Prosthetic Technics.
H. C. MATLACK, D.D.S., Consulting Oral Surgeon Cincinnati Hospital. Demonstrator of Anatomy.
DAVID STERN, B.S., D.D.S., Demonstrator of Analytical Chemistry.
L. T. IVINS, D.D.S., Assistant Instructor in Bacteriology.
GEO. T. FETTE, B.A., D.D.S., Assistant Instructor in Histology.

The Fifty-fourth Annual Session begins October 10, 1899, and closes May 10, 1900.
A Spring Course of Clinical Instruction begins May 10, 1900.
A Fall Course of Clinical Instruction begins September 1, 1900.

For further information and announcement, address

H. A. SMITH, D.D.S., Dean,

or H. T. SMITH, D.D.S., Secretary,

116 Garfield Place, CINCINNATI, O.

New Orleans College of Dentistry,

Corner Carondelet and Lafayette Streets.

FACULTY.

JULES J. SARRAZIN, D.D.S., Dean, Professor of Operative Dentistry, Operative Technics, Dental Prophylaxis.
L. D. ARCHINARD, D.D.S., Professor of Dental Surgery, Oral Pathology and Therapeutics.
S. R. OLLIPHANT, M.D., Professor of Chemistry, General Materia Medica, Hygiene.
JOHN J. ARCHINARD, A.M., M.D., Professor of Physiology, Microscopical Anatomy, Bacteriology, General Pathology.
H. B. GESSNER, A.M., M.D., Treasurer, Professor of General and Special Anatomy, General and Oral Surgery.
CHAS. ECKHARDT, D.D.S., Professor of Dental Anatomy, Orthodontia, Dental Materia Medica.
C. V. VIGNES, D.D.S., Secretary, 637 Canal street, New Orleans, La., Professor of Prosthetic Dentistry, Metallurgy, Prosthetic Technics.

SPECIAL LECTURERS.

ANDW. G. FRIEDRICHS, M.D., Oral Surgery.
JOSEPH BAUER, D.D.S., Prosthetic Dentistry.
C. EDMUND KELLS, D.D.S., X Ray in Dentistry.
PHIL. J. FRIEDRICHS, D.D.S., Obturators.
MARTIN VIET, D.D.S., Operative Dentistry.
M. R. FISHER, D.D.S., Crown- and Bridge-Work.
W. E. WALKER, D.D.S., Orthodontia.
OTTO LERCH, A.M., M.D., Ph.D., Physiological Chemistry.
E. B. KRUTTSCHNITT, A.M., LL.D., Dental Jurisprudence.
H. J. FELTUS, D.D.S., Porcelain Dental Art.
A. L. METZ, M.D., M.Ph., Organic Chemistry.

DEMONSTRATORS.

J. P. BAYON, D.D.S., Operative Dentistry.
CHAS. MERMILLIOD, Jr., D.D.S., Prosthetic Dentistry.
P. A. MICHEL, D.D.S., Operative Technics.
H. P. MAGRUDER, D.D.S., Prosthetic Technics.
P. L. CUSACHS, A.B., M.D., Ph.G., Chemistry.
L. PERRILLIAT, B.Sc., M.D., Anatomy.
EDWARD B. PREIS, M.D., Microscopical Anatomy and Bacteriology.

ASSISTANT DEMONSTRATORS.

A. J. FORET, D.D.S., Operative Dentistry.
H. L. JENSEN, D.D.S., Operative Dentistry.
WALLACE WOOD, Jr., D.D.S., Prosthetic Dentistry.
R. H. WELSH, D.D.S., Prosthetic Dentistry.

CLINICAL LECTURERS.

C. L. ALEXANDER, D.D.S.
W. V. B. AMES, D.D.S.
C. R. BAKER, D.D.S.
A. R. BEGUN, D.D.S.
V. C. BELL, D.D.S.
A. J. BERCIER, D.D.S.
E. PARMLY BROWN, D.D.S.
WALKER G. BROWNE, D.D.S.
B. D. BRABSON, D.D.S.
G. B. CLEMENT, D.D.S., M.D.
T. M. COMEGYS, D.D.S.
RUSSELL H. COOL, D.D.S.
A. N. COPSEY, D.D.S.
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J. G. FIFE, D.D.S.
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H. H. HARRISON, D.D.S.
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M. J. MASSENGILL, D.D.S.
M. S. MERCHANT, D.D.S.
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E. TELLE.
T. C. VAN KIRK, D.D.S.
T. C. WEST, D.D.S.
F. C. WILSON, D.D.S.

CALENDAR.

Entrance examinations, conducted by the office of the Superintendent of Public Instruction for students arriving without the required preliminary education certificate, begin November 2. Examinations for advancement (one day only), November 3. Opening of regular winter session, at 8.30 A.M., November 6. Matriculation for full session closes November 15. Final examinations begin: Senior class May 21, Junior and Freshman classes May 27. Commencement exercises June 4. Summer practical operative and prosthetic dentistry courses open June 5; close October 31.

The College adheres to all rules of the National Association of Dental Faculties and of the National Association of Dental Examiners.

For further information and catalogue address

C. V. VIGNES, D.D.S., Secretary,
637 Canal St., New Orleans, La.

New York College of Dentistry.

Incorporated by the Legislature of the State of New York in 1865.

THIRTY-FOURTH COLLEGIATE YEAR.

The collegiate year work of 1899-1900 will consist of a FREE Infirmary Course (OPTIONAL) of daily infirmary practice, from May 16, 1899, to October 2, 1899, to students matriculated for the collegiate year; and a Lecture Session (OBLIGATORY) of lectures, practical classes in sections and daily infirmary practice, from October 2, 1899, to May 14, 1900.

A special feature of the curriculum of the New York College of Dentistry is that students work, *daily*, in the Infirmary, for the entire period of their college attendance—first, second, and third year—under the direction of the superintendents and demonstrators of the Infirmary.

Registration for the Lecture Session of 1899-1900 closes October 12, 1899.

Applicants will be admitted to the Lecture Session of 1899-1900 as DEGREE, SPECIAL, or SESSION STUDENTS.

1. DEGREE STUDENTS.

Those matriculating toward the degree of D.D.S. under the following preliminary educational requirements:

a. For those who were matriculated in a registered dental or medical college prior to January 1, 1896, no preliminary educational conditions will be required, either for the degree of the college or the license examination of the state of New York.

b. For those who were matriculated in a registered dental or medical college between January 1, 1896, and January 1, 1897, a certificate of two years of high school attendance or their equivalent in credentials from schools registered by the Regents or pass cards for 24 academic counts obtained by Regents examinations.

c. **For those matriculated between January 1, 1897, and January 1, 1900, a certificate of three years of high school attendance or their equivalent in credentials from schools registered by the Regents or pass-cards for 36 academic counts obtained by Regents' examinations.**

d. **Special attention is called to the fact, that there will be required of those not matriculated before January 1, 1900, a certificate of four years high school attendance or their equivalent from schools registered by the Regents or pass-cards for 48 academic counts obtained by Regents examinations.**

A graduate of a dental college *out* of the state of New York is not admitted to the dental license examination of the state of New York unless he has fulfilled the preliminary educational requirements of a "Degree Student," as stated above.

2. SPECIAL STUDENTS.

Those who, without any preliminary educational requirements, matriculate, but not toward the degree, and attend the Infirmary practice, with lecture attendance FREE, pending their securing the preliminary educational requirements to become a "Degree Student," with their "Special Student" period credited as pupilage only. On the date of their being entitled thereto they may become "Degree Students."

3. SESSION STUDENTS.

Those who, without any preliminary educational requirements, matriculate for their first or first and second lecture sessions, but not toward the degree, pay the fees and are eligible to the examinations and certificates of the sessions. The certificates of the session or sessions will admit them to advance standing toward the degree in dental colleges OUT OF THE STATE belonging to the National Association of Dental Faculties.

For full details of the college send for an announcement of 1899-1900 and a copy of "Form I," addressing

FANEUIL D. WEISSE, M.D., Dean,
205-207 East 23d Street,
NEW YORK, N. Y.

Pennsylvania College of Dental Surgery.

Eleventh Street, below Spruce, corner of Clinton St.

FACULTY.

C. N. PEIRCE, D.D.S., Professor of Principles and Practice of Operative Dentistry.
WILBUR F. LITCH, M.D., D.D.S., Professor of Materia Medica, Therapeutics, and Principles of Prosthetic Dentistry.
HENRY LEFFMANN, M.D., D.D.S., Professor of Chemistry and Metallurgy.
ALBERT P. BRUBAKER, M.D., D.D.S., Professor of Physiology, General Pathology, and Bacteriology.
I. NORMAN BROOMELL, D.D.S., Professor of Dental Anatomy, Dental Histology, and Prosthetic Technics.
GEO. W. WARREN, A.M., D.D.S., Professor of Clinical Dentistry and Oral Pathology.
PERCIVAL E. LODER, M.D., D.D.S., Professor of Anatomy.
W. J. ROE, M.D., D.D.S., Professor of Surgical Pathology and Oral Surgery.

AUXILIARY INSTRUCTORS—Instructors in Operative Dentistry.

E. ROLAND HEARN, D.D.S. } Chief Instructors.
F. A. CONEY, D.D.S. }
LOUIS BRITTON, D.D.S.
W. K. THORPE, D.D.S.
J. W. ADAMS, D.D.S.
JOHN A. MORAN, D.D.S.
META TUDOR HALEY, D.D.S.

Instructors in Prosthetic Dentistry.

RUPERT G. BEALE, D.D.S.
FREDERICK R. BRUNET, D.D.S.
W. T. HERBST, D.D.S.
E. A. BRUNETT, D.D.S.
J. CLARENCE SALVIS, D.D.S.
W. H. PERDUE, D.D.S.
LE ROY D. SHAFER, D.D.S.
EDWARD F. WAYNE, D.D.S., Instructor in Chemistry.
A. GRANT LODER, A.M., M.D., Instructor in Anatomy.

Special.

CHARLES S. HEARN, M.D., Instructor in Histology and Microscopy.
WILLIAM B. WARREN, D.D.S., Instructor in Crown- and Bridge-Work.
F. A. CONEY, D.D.S., Instructor in Carving Block-Teeth, Porcelain Inlays, Continuous-Gum Work, etc.
F. P. RUTHERFORD, PH.G., D.D.S., Instructor in Bacteriology, Pharmacology, etc.
RUPERT G. BEALE, D.D.S., Instructor in Appliances for Cleft-Palate Deformities and Maxillary Fractures.
CHARLES P. SHOEMAKER, D.D.S., Instructor in Carving and Modeling.

Clinical Instructors.

Dr. J. N. FARRAR,
Dr. W. G. A. BONWILL,
Dr. A. L. NORTHROP,
Dr. C. S. STOCKTON,
Dr. C. E. FRANCIS,
Dr. A. H. BROCKWAY,
Dr. C. PALMER,
Dr. CHAS. F. BONSALL,
Dr. T. F. CHUPEIN,
Dr. W. R. MILLARD,
Dr. W. H. TRUEMAN,
Dr. R. HOLLENBACK,
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Dr. H. NEWTON YOUNG,
Dr. J. H. GASKILL,
Dr. MARY H. STILWELL,
Dr. G. L. S. JAMESON,
Dr. H. C. REGISTER.

This College has accepted the requirements of the National Association of Dental Faculties with regard to admission and graduation of students. (See announcement for 1899-1900.)

Fall Session.

THE FALL COURSE will commence September 11, and continue until the 1st of October, and will be free to those who matriculate for the regular session.

The Regular Session

Will commence on October 1, 1899, and continue until May 1.

Clinical Practice.

Lecture hours excepted, general clinical practice is available for the student continuously through the day. Competent instructors are always present.

Graduation in Medicine.

By an arrangement with Jefferson Medical College, such students as may desire to do so can, if found qualified, obtain the two degrees, in Dentistry and Medicine, in five years.

FEES.

Matriculation (paid but once)	$5.00
For each year	100.00
Dissecting Fee	10.00
Diploma Fee	30.00

Board can be obtained at from $4.00 to $6.00 per week.

The instruments and tools required can be procured for from $35.00 to $45.00. This sum does not include the price of dental engine.

For further information, address

WILBUR F. LITCH, M.D., D.D.S., Dean, 1507 Walnut St., Philada.
GEO. W. WARREN, A.M., D.D.S., Secretary, 1338 Walnut St., Philada.

Harvard University, Dental Department.

BOSTON, MASS., 1899-1900.

FACULTY.

CHARLES W. ELIOT, LL.D., President.
EUGENE H. SMITH, D.M.D., Dean, and Professor of Mechanical Dentistry and Orthodontia.
J. COLLINS WARREN, M.D., Professor of Surgery.
HENRY P. BOWDITCH, M.D., Professor of Physiology.
THOMAS DWIGHT, M.D., Professor of Anatomy.
THOMAS FILLEBROWN, M.D., D.M.D., Professor of Operative Dentistry and Oral Surgery.
WILLIAM B. HILLS, M.D., Assistant Professor of Chemistry.
CHARLES S. MINOT, S.D., Professor of Histology.
HAROLD C. ERNST, M.D., Professor of Bacteriology.
CHARLES A. BRACKETT, D.M.D., Professor of Dental Pathology.
EDWARD C. BRIGGS, M.D., D.M.D., Professor of Materia Medica and Therapeutics.
JERE E. STANTON, M.D., D.M.D., Assistant Professor in Oral Anatomy, Physiology, and Bacteriology.
WILLIAM P. COOKE, D.M.D., Instructor in Crown- and Bridge-Work, and in Metallurgy.
FRANKLIN DEXTER, M.D., Assistant Professor of Anatomy.
WILLIAM H. POTTER, D.M.D., Lecturer in Operative Dentistry.

OTHER INSTRUCTORS.

FOREST G. EDDY, D.M.D., Instructor in Operative Dentistry.
GEORGE H. MONKS, M.D., Instructor in Surgical Pathology.
EDWARD W. TAYLOR, M.D., Instructor in Neurology.
EZRA F. TAFT, D.M.D., Instructor in Operative Dentistry.
JULIUS G. W. WERNER, D.M.D., Clinical Instructor in Operative Dentistry.
DWIGHT M. CLAPP, D.M.D., Clinical Lecturer in Operative Dentistry.
EDWIN C. BLAISDELL, D.M.D., Instructor in Operative Dentistry.
WALDO E. BOARDMAN, D.M.D., Instructor in Operative Dentistry, Curator of Museum, and Librarian.
FREDERICK BRADLEY, D.M.D., Instructor in Operative Dentistry.
HENRY L. UPHAM, D.M.D., Instructor in Operative Dentistry.
ARTHUR H. STODDARD, D.M.D., Clinical Lecturer in Mechanical Dentistry.
PATRICK W. MORIARTY, D.M.D., Demonstrator of Mechanical Dentistry, and Instructor in the Mechanical Treatment of Fractured Jaws and Cleft Palates.
HARRY O. BIXBY, D.M.D., Instructor in Mechanical Dentistry.
ARTHUR W. ELDRED, D.M.D., Instructor in Mechanical Dentistry.
ROBERT J. McMEEKIN, D.M.D., Demonstrator of Operative Dentistry.
NATHAN P. WYLLIE, D.M.D., Instructor in Materia Medica and Anesthesia.
ALLEN S. BURNHAM, D.M.D., Instructor in Mechanical Dentistry.
THOMAS B. HAYDEN, D.M.D., Instructor in Mechanical Dentistry.
WALTER H. WHITE, D.M.D., Assistant Demonstrator of Operative Dentistry.
DWIGHT WARD DICKINSON, D.M.D., Instructor in Operative Dentistry.
EDWIN L. FARRINGTON, D.M.D., Assistant Demonstrator of Operative Dentistry.
ASHER H. St. C. CHASE, D.M.D., Assistant Demonstrator of Mechanical Dentistry.
FREDERICK E. MEADER, D.M.D., Instructor in Mechanical Dentistry.
HARRY W. HALEY, D.M.D., Instructor in Mechanical Dentistry.
HAROLD DeWITT CROSS, D.M.D., Instructor in Mechanical Dentistry.
HENRY C. SMITH, Ph.G., Instructor in Chemistry.
JOHN DANA DICKINSON, D.M.D., Clinical Instructor in Mechanical Dentistry.
GEORGE L. FORREST, D.M.D., Instructor in Mechanical Dentistry.
ELLIS P. HOLMES, D.M.D., Instructor in Operative Dentistry.
CHARLES E. PERKINS, D.M.D., Instructor in Operative Dentistry.
GEORGE RUFUS GRAY, D.D.S., D.M.D., Instructor in Operative Dentistry.
JOSEPH T. PAUL, D.M.D., Instructor in Operative Dentistry.
FRANK T. TAYLOR, D.M.D., Instructor in Operative Dentistry.

The Thirty-first Annual Session of this school begins September 28, 1899, and ends June 28, 1900, with a recess of one week at Christmas, and another in April, making a school-year of nine months of practically continuous work.

General Anatomy, Physiology, General Chemistry, Hygiene, Histology and Embryology, and Bacteriology, together with ample dissecting under able demonstrators, are the studies of the first year, and are identical with those of the Harvard Medical School. The studies for the second year are Operative and Mechanical Dentistry and Orthodontia, Crown- and Bridge-Work and Metallurgy, Materia Medica and Therapeutics, Oral Anatomy and Physiology, and Bacteriology, Dental Pathology, and Oral Surgery. Of the third year the studies are Operative and Mechanical Dentistry and Orthodontia, Crown- and Bridge-Work, and Metallurgy. Neurology and Surgical Pathology and Surgery. Attention is called to the fact that TWENTY-SEVEN MONTHS of progressive instruction compose the required three years in the school.

All applicants for advanced standing must pass the examination of the years they desire to omit, or furnish proof that they have passed EQUIVALENT examinations.

The University Degree, D.M.D. (Dentariæ Medicinæ Doctor), is conferred upon all who fulfill the requirements.

Graduates of recognized dental schools will be admitted to the course of Operative and Mechanical Dentistry on payment of $50 each, or $100 for both, for the whole or any portion of the academic year.

FEES.

There are no fees for matriculation, nor for the the diploma, nor for the demonstrators. For the first year the student is a member of the school the fee is $200, payable in two instalments of $120 and $80; for the second year, $150, in two payments of $100 and $50; for the third year, $150, in two payments of $100 and $50. For any subsequent year, $50, payable at the beginning of the year. For information and announcement, address

EUGENE H. SMITH, Dean, 283 Dartmouth St., Boston, Mass.

University of Pennsylvania,

DEPARTMENT OF DENTISTRY.

FACULTY.

CHARLES C. HARRISON, LL.D., Provost, and *ex-officio* President.

CHARLES J. ESSIG, M.D., D.D.S., Professor of Mechanical Dentistry and Metallurgy.
EDWIN T. DARBY, M.D., D.D.S., Professor of Operative Dentistry and Dental Histology.
JAMES TRUMAN, D.D.S., Professor of Dental Pathology, Therapeutics, and Materia Medica.
EDWARD C. KIRK, D.D.S., Professor of Clinical Dentistry.
EDWARD T. REICHERT, M.D., Professor of Physiology.
GEORGE A. PIERSOL, M.D., Professor of Anatomy.
JOHN MARSHALL, M.D., NAT. Sc.D., Professor of Chemistry.

MATTHEW H. CRYER, M.D., D.D.S., Assistant Professor of Oral Surgery.
GEORGE G. MILLIKEN, M.D., D.D.S., Assistant Professor of Operative Technics.

JOHN D. THOMAS, D.D.S., Lecturer on Nitrous Oxid.
NORMAN STURGES ESSIG, D.D.S., Lecturer on Mechanical Dentistry.
MEYER L. RHEIN, M.D., D.D.S., Lecturer on Dental Pathology.
SAFFORD G. PERRY, D.D.S., Lecturer on Operative Dentistry.
FREDERICK A. PEESO, D.D.S., Lecturer on Crown- and Bridge-Work.

CLINICAL INSTRUCTORS.

Dr. C. C. BECK,
Dr. W. G. A. BONWILL,
Dr. W. R. MILLARD,
Dr. D. N. McQUILLEN,
Dr. E. H. NEALL,
Dr. H. C. REGISTER,
Dr. EDW. I. KEFFER,
Dr. R. R. UNDERWOOD,
Dr. I. F. WARDWELL,
Dr. JOHN R. YORKS.

DEMONSTRATORS.

Operative Dentistry.

WILLIAM DIEHL, D.D.S., Chief Demonstrator.

Assistants.

JOSEPH W. WHITE, D.D.S.
JAMES E. LODER, D.D.S.
WILSON ZERFING, D.D.S.
R. HAMILL D. SWING, D.D.S.
NEWTON C. HASSELL, D.D.S.
WM. C. MARSH, D.D.S.
FREDERICK W. ALLEN, D.D.S.

Mechanical Dentistry.

JAMES G. LANE, D.D.S., Chief.
FREDERICK W. AMEND, JR., D.D.S.
A. SWANTON BURKE, D.D.S.
JAMES A. DOWDEN, D.D.S.
HARRY B. HICKMAN, D.D.S.
MILTON N. KEIM, JR., D.D.S.
ROBERT J. SEYMOUR, D.D.S.
EUGENE LINCOLN, D.D.S.

Crown- and Bridge-Work.

J. E. DUNWOODY, D.D.S., Chief.
JOS. M. HILL, D.D.S.
AMBLER TEES, Demonstrator Continuous-Gum Work.
AUGUSTUS KOENIG, M.D., Demonstrator of Metallurgy.

Normal Histology.

ROBERT FORMAD, M.D.
GEO. H. CHAMBERS, M.D.
AUGUSTUS KOENIG, M.D.

Chemistry.

DANIEL W. FETTEROLF, M.D.

Anatomy.

EDMUND W. HOLMES, M.D.

Osteology.

RICHARD H. HARTE, M.D.

CONDITIONS OF ADMISSION.

Candidates for admission are required to present evidence of a preliminary education as follows:

For the session of 1899-1900 a certificate of two years' high school attendance; for the session of 1900-01 a diploma of an approved high school having a three-years' course or certificate showing three years' attendance at a high school having a four-years' course, certificates from other schools showing equivalent education. In lieu of such diploma or certificates, the applicant will be required to pass a matriculate examination which will in each case be the equivalent of that forming the basis of the certificates of required preliminary education.

N. B.—Special attention is called to the rule adopted by the National Association of Dental Faculties, August, 1895, requiring all applicants for matriculation to be present and enter their names not later than the tenth of October. This rule applies equally to students entering the second and third year classes.

FEES.

Matriculation Fee (paid once only)...	$5.00	Dissecting Fee (Second Year)........	$10.00
Fee for One Course of Lectures......	100.00	Graduation Fee (Third Year)..........	30.00

Board can be obtained at from five to eight dollars per week, according to location and accommodations.

University of Pennsylvania.—Dental Department.

The Dental Department is located in "Dental Hall," the new building especially erected for its use. The facilities thus afforded are, it is believed, unequalled for securing an education complete in all departments of dental science and art. The clinical operating room is 180 by 50 feet, lighted on all sides, and furnished with 100 Wilkerson Chairs of latest pattern, especially constructed for the Department. Each operating chair has a fountain spittoon attached, also especially designed and constructed for this Department. Electrical service is supplied to all of the chairs, and is of a character to cover all of the applications of electricity to dentistry. The Prosthetic Department is supplied with laboratory facilities devoted to every branch of the work. Prosthetic technic, in vulcanite and metal work, porcelain work, continuous-gum work, and crown- and bridge-work, is taught by modern methods in separate laboratories especially equipped for the purpose. The laboratories are furnished with power lathes and with compressed-air apparatus for soldering and metallurgical operations.

The clinical patronage of the Department is always in excess of the needs of the students.

Oral surgical clinics, also general surgical clinics, are held twice a week.

Practical instruction in Chemistry, Metallurgy, Histology, Physiology and Bacteriology is given in appropriately equipped laboratories.

The Dissecting-Room is large, well lighted, thoroughly ventilated, and is furnished with ample material for the successful prosecution of anatomical studies.

The technic or manual training method of imparting instruction is developed in relation to all departments where it has been found applicable.

All of the departments of practical laboratory and clinical instruction are in charge of competent and experienced demonstrators, who are ably assisted in the work of instruction by a full corps of expert assistants.

The Dental Department of the University is an integral part of the University system. Its students at the discretion of the Dean are permitted to take courses of instruction in other departments of the University without additional fees, and are eligible to and participate in all those features of University life common to the whole student body of the institution. These include its athletic features and privileges of the Howard Houston Hall, the club house of an organization governed by the University students and having all of the appointments and desirable features of a strictly first-class club. The dormitories of the University are the best of their kind in this country, and to these the students of dentistry are admitted in common with the students of all the other departments.

The Regular or Winter Session.

The session begins October 1, and ends at Commencement, early in June. The number of lectures per week, with a synopsis of the various branches taught, will be found in the General Catalogue.

In order to facilitate work in the practical departments, the regular winter session is so arranged that the first-course student is required to divide the morning hours equally between DENTAL TECHNICS, HISTOLOGICAL, AND CHEMICAL LABORATORY WORK.

During the second and third years the student has the entire forenoon of each day for practical dental work. Ample opportunity is thus afforded for practice in operative and prosthetic dentistry. The first-year classes are divided into sections, the time not otherwise engaged being devoted to practice in the operative and mechanical rooms.

This plan of GRADING THE COURSE, and of affording the first and second year students an opportunity of coming forward for examination in certain branches, not only proves an economical arrangement of their time, but greatly facilitates their labors in the acquirement of knowledge in the remaining branches.

Plan of Examination.

Attendance upon three regular courses of lectures will be required before the student can take the final examination for the degree of Doctor of Dental Surgery.

At the close of the first year, final examinations are held in CHEMISTRY AND MATERIA MEDICA, ELEMENTARY ANATOMY, HISTOLOGY, OSTEOLOGY, and MYOLOGY, and in PHYSIOLOGY excepting the Muscular and Nervous Systems. At the end of the second year the student is examined finally upon ANATOMY and PHYSIOLOGY; and progress in OPERATIVE AND MECHANICAL DENTISTRY; if he is not qualified, a second examination is afforded him at the beginning of the next winter session.

The final examination at the close of the third year is in OPERATIVE DENTISTRY, MECHANICAL DENTISTRY, METALLURGY, BACTERIOLOGY, CLINICAL DENTISTRY, DENTAL PATHOLOGY AND THERAPEUTICS, AND ORAL SURGERY.

All applicants for advanced standing must pass the required examinations of this school, or furnish proof that they have passed EQUIVALENT examinations in some recognized dental or medical school. Graduates of a recognized medical college will be admitted to the second-year class without examination.

For detailed information and announcements, address

EDWARD C. KIRK, D.D.S.,
Dean of the Dental Faculty,
Dental Hall, Cor. 33d and Locust Sts., Philadelphia, Pa.

Chicago College of Dental Surgery

Dental Department of Lake Forest University.

The Annual Winter Course of Instructions will begin about October 1, 1899, and end about May 1, 1900.

Three full winter courses of lectures are required before graduation. Graduates of pharmaceutical and undergraduates of medical colleges in good standing and graduates of reputable veterinary colleges are admitted to the second year course, and can become candidates for graduation after taking two full winter courses of instruction.

FACULTY.

J. G. K. McCLURE, D.D., President of the University.
NICHOLAS SENN, M.D., Ph.D., LL.D., Consulting Surgeon.
TRUMAN W. BROPHY, M.D., D.D.S., LL.D., Dean, Professor of Oral Surgery, 126 State street, Champlain Building, Chicago.
W. L. COPELAND, M.D., C.M., M.R.C.S., Professor of Anatomy, 866 West Monroe street, Chicago.
W. T. BELFIELD, M.D., Professor of Principles of Surgery, 112 Clark street, Chicago.
FRANK H. GARDINER, M.D., D.D.S., Clinical Professor of Operative Dentistry, Marshall Field Building, Chicago.
C. N. JOHNSON, L.D.S., D.D.S., A.M., Professor of Operative Dentistry, Marshall Field Building, Chicago.
W. C. BARRETT, M.D., D.D.S., Professor of Dental Anatomy and Pathology; Residence, Buffalo, N. Y.
L. L. SKELTON, A.M., M.D., Professor of Physiology, 70 State street, Chicago.
CALVIN S. CASE, M.D., D.D.S., Professor of Orthodontia, Stewart Building, Chicago.
A. W. HARLAN, A.M., M.D., D.D.S., Professor of Materia Medica and Therapeutics, Masonic Temple, Chicago.
J. NEWTON ROE, A.M., Sc.D., Professor of Chemistry and Metallurgy, Valparaiso, Ind.
E. J. PERRY, D.D.S., Professor of Prosthetic Dentistry, Stewart Building, Chicago.

TOPICAL STATEMENT OF WORK.

FIRST YEAR.

During the Freshman year the studies taken up are: Theoretical and Practical Chemistry, Anatomy, Physiology, Materia Medica, Dental Anatomy, Histology, Operative and Prosthetic Technics, and Operative and Prosthetic Dentistry.

Recitations in this course are conducted daily in commodious rooms specially arranged for this method of teaching. Stated lessons assigned from approved text-books supplement the didactic lectures and work in the laboratories.

SECOND YEAR.

During the Junior year students complete the work in Anatomy, Physiology, Chemistry, Histology, Pathology, and Bacteriology, and Materia Medica. In addition to this they receive instruction in Comparative Dental Anatomy, Crown- and Bridge-Work, Regulating Appliances, Splint and all kinds of Plate Work, and operate in the infirmary.

THIRD YEAR.

During the Senior year the students listen to lectures on Oral Surgery, Therapeutics, Operative Dentistry, Dental Anatomy and Pathology, Orthodontia, and attend Clinics. In addition to the lectures each student is required to operate in the Infirmary and perform practical work in the Laboratory.

Letters of inquiry should be addressed to

Dr. TRUMAN W. BROPHY, Dean, 126 State Street, Chicago, Ill.

THE TUFTS COLLEGE

Dental School,

FORMERLY

BOSTON DENTAL COLLEGE

For Men and Women,

Will commence its regular session on

Monday, Sept. 11, 1899.

The entrance examination will be held on that date at 10 A.M. at the

MEDICAL SCHOOL BUILDING,

Corner of Shawmut Ave. and Rutland St.

All students must be enrolled not later than September 21, which is a rule of the National Association of Dental Faculties, to which this school belongs.

The Degree conferred will be Doctor of Dental Medicine.

For catalogues or other information, address

CHARLES P. THAYER, A.M., M.D., Secretary,
74 Boylston Street, Boston, Mass.

University of Maryland,

DENTAL DEPARTMENT.

N. E. Corner Lombard and Greene Streets, Baltimore, Md.

Hon. SEVERN TEACKLE WALLIS, LL.D., Provost.

FACULTY.

FERDINAND J. S. GORGAS, M.D., D.D.S., Professor of Principles of Dental Science, Surgery, and Mechanism.
JAMES H. HARRIS, M.D., D.D.S., Professor of Operative and Clinical Dentistry.
FRANCIS T. MILES, M.D., Professor of Physiology.
L. McLANE TIFFANY, M.D., Clinical Professor of Oral Surgery.
RANDOLPH WINSLOW, M.D., Professor of Anatomy.
R. DORSEY COALE, PH.D., Professor of Chemistry and Metallurgy.
I. EDMONDSON ATKINSON, M.D., Professor of Materia Medica and Therapeutics.
JOHN C. UHLER, M.D., D.D.S., Demonstrator of Mechanical Dentistry.
ISAAC H. DAVIS, M.D., D.D.S., Demonstrator of Operative Dentistry.
I. HOLMES SMITH, M.D., } Demonstrators of Anatomy.
RIDGELY B. WARFIELD, M.D., }

The Principal Demonstrators are assisted by sixteen Assistant Demonstrators. Special Instructions are given in Continuous-Gum and Bridge-Work.

At stated times during the Annual Sessions a number of prominent dental practitioners will hold Clinics and deliver Clinical Lectures.

Each year since its organization has added to the reputation and prosperity of this University Dental School, until now its graduates, in almost every part of the civilized world, are meeting with the success that ability will ever command. The past session was the most successful one in number of matriculates ever held; and visiting dentists from all parts of this country have expressed themselves as being astonished and gratified at the ability shown by the students when operating upon patients in the infirmary. Forming one of the departments of ONE OF THE OLDEST UNIVERSITIES in this country, its diploma is everywhere recognized and honored.

The instruction in both operative and mechanical dentistry is as thorough as it is possible to make it, and embraces everything pertaining to dental art. The advantages which the general and oral surgical clinics to which the dental students are admitted, as indeed to all the lectures of the University, afford, cannot be overestimated. The many thousands of patients annually treated in the University Hospital, well known to be the largest Hospital in Baltimore, afford an abundance of material for dental infirmary and laboratory practice, and the oral surgery clinics.

The Infirmary and Laboratory practice for students is exceptionally large, a fact that adds so greatly to the facilities of this Dental School.

The Dental Infirmary and Laboratory Building is one of the largest and most complete structures of the kind in the world. The Infirmary is lighted by forty-seven large windows, and is furnished with the most improved operating chairs. It has again become necessary to enlarge the Dental Building, making an Infirmary nearly one hundred feet long, and a Laboratory eighty feet long and forty-three feet wide.

The Dental Infirmary and Laboratory are open daily (except Sunday) during the entire year for the reception of patients; and THE PRACTICE OF DENTAL STUDENTS has increased to such an extent that all the students during the past season have had an abundance of practical work in both operative and prosthetic dentistry. This means for practical instruction has already assumed such large proportions that the supply has been beyond the needs of the large classes in attendance during the past sessions. The exceedingly large number of patients for the extraction of teeth affords ample facilities for practical experience to every student.

In addition to the facilities afforded by this institution for a thorough course of instruction in the theory and practice of dentistry, the clinics in the University Hospital enable the Dental equal with the Medical Students to become familiar with the diseases and operations of Practical Surgery. Excisions of jaw, partial or entire; tumors, cancerous or benign, of various parts of the buccal cavity; plastic operations for restoration of cheek, lips, etc., may be mentioned as having been before the class during the year. The induction of anesthesia by means of different agents—ether, chloroform, bromide of ethyl, nitrous oxid gas, all being used in the clinics—cannot fail to be of use to the student of Oral Surgery. Junior as well as Senior students are afforded every opportunity for practical instruction in both operative and mechanical dentistry.

The Lecture Halls in the University Buildings are large and well lighted; and every facility will be afforded for practical and theoretical dental instruction. Demonstrations in Anatomy, Physiology, and Pathology (for which an abundance of material is furnished free of charge) also form an important part of the regular course. The Dissecting Room is large, well ventilated and lighted, and the Demonstrator of Practical Anatomy passes much of his time assisting the students and directing their labors. Dissecting Material is furnished in abundance, free of charge.

The Qualifications for admission and Graduation are those adopted by the National Association of Dental Faculties and the State Dental Examining Boards. The Diplomas of this School are recognized by all State Dental Examining Boards.

Qualifications for Graduation: The candidate must have attended three full courses of lectures of five months each in different years at the Regular or Winter Sessions in this institution. As equivalent to one of these, one course in any reputable dental college will be accepted. Graduates of medicine can enter the Junior Class. The matriculant must have a good English education; a diploma from a reputable literary institution, or other evidence of literary qualifications will be received instead of a preliminary examination. All students, both juniors and seniors, have equal advantage in operative and mechanical dentistry in this institution throughout every session.

Graduation in Medicine: Graduates of the Dental Department of the University of Maryland are required to attend but one session at the University School of Medicine prior to presenting themselves as candidates for the degree of "Doctor of Medicine." (See Catalogue.)

The Regular or Winter Session will begin on the 1st day of October, and will terminate in March of each year.

The Summer Session, for practical instruction, will commence in March, and continue until the Regular Session begins. Students in attendance on the Summer Session will have the advantage of all the daily Surgical and Medical Clinics of the University.

The fees for the Regular Session are $100, Demonstrators' fees included; Matriculation Fee, $5; Diploma Fee, for candidates for graduation, $30; Dissecting Ticket, $10.

For Summer Session, no charge to those who attend the following Winter Session.

Board can be obtained at from $3.50 to $5.00 per week, according to quality.

The University Prize and a number of other Prizes will be specified in the annual Catalogue.

Students desiring information and the annual Catalogue will be careful to give full address and direct their letters to

F. J. S. GORGAS, M.D., D.D.S.,

Dean of the Dental Department of the University of Maryland,

845 N. Eutaw Street, Baltimore, Md.

Michigan University Dental College.

ADMISSION EXAMINATIONS are held during the last week of June and September.

THE ANNUAL TERM begins October 1 and continues for nine months, closing the last week in June.

THE AVERAGE ANNUAL FEES for tuition and laboratory expenses will be about $65 for non-residents of Michigan.

THE ANNUAL ANNOUNCEMENT contains particulars and will be sent on request.

J. TAFT, Dean,

Ann Arbor, Mich.

Missouri Dental College.

Dental Department of Washington University.

ST. LOUIS, MO.

Session begins each year in September and ends in April. Our laboratories are well equipped and admirably adapted for the comfort and instruction of 400 students. Our Dental Infirmary offers unequaled opportunities for practical instruction. Our clinical facilities are of the best.

Many years' experience as a school of high standard have perfected the three years' graded course.

Apply at the College Building, 1806-1814 Locust St.

HENRY H. MUDD, M.D., Dean.
A. H. FULLER, M.D., Secretary.

Northwestern University DENTAL SCHOOL.

The American College of Dental Surgery has been consolidated with this School.

AMERICAN COLLEGE OF DENTAL SURGERY
AMERICAN COLLEGE of DENTAL SURGERY
FRANKLIN St. MADISON St.
Eng. Bauer

After May 1, 1895,

Cor. Madison and Franklin Sts., Chicago, Ill.

Fall and Winter Sessions of Lectures and Clinics, with Infirmary Practice.

OCTOBER 8 to APRIL 2.

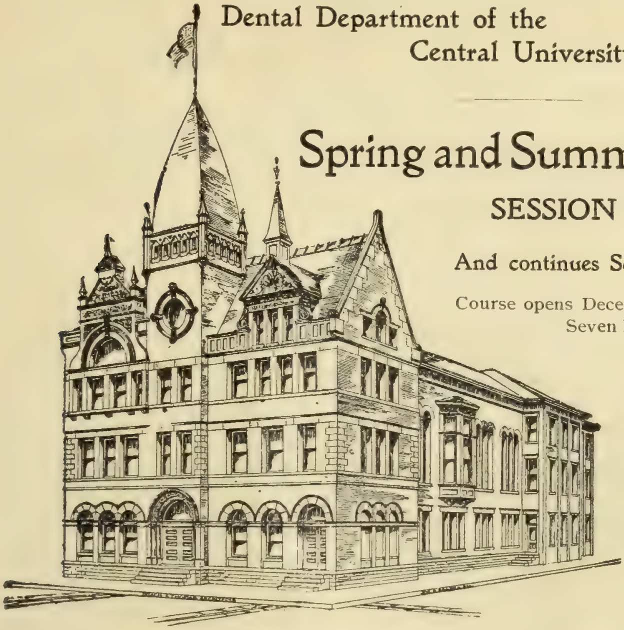
Post-Graduate Course from April 1 to October 1.

For Catalogue and Circulars, address

THEO. MENGES, D.D.S.,
Cor. Madison and Franklin Streets, Chicago, Ill.

LOUISVILLE COLLEGE OF DENTISTRY,

Dental Department of the
Central University of Kentucky.



Spring and Summer School.

SESSION DEC. 1,

And continues Seven Months.

Course opens December 1, and continues Seven Months.

For Catalogue, address

P. Richard Taylor, M.D.
DEAN,
Louisville, Ky.

Hospital College of Medicine and Infirmary, opposite City Hospital, Louisville, Ky. Sessions begin January 2 and continue six months.

Address

P. RICHARD TAYLOR, M.D., Dean, Louisville, Ky.

BIRMINGHAM DENTAL COLLEGE,

BIRMINGHAM, ALA.

Session 1899-1900. The regular Winter Session will begin October 1, 1899, and continue until May 1, 1900.

ALL THE BRANCHES APPERTAINING TO

DENTAL SCIENCE AND ART

ARE THOROUGHLY TAUGHT.

THIS COLLEGE IS A MEMBER OF THE NATIONAL ASSOCIATION OF DENTAL FACULTIES.

For Catalogue and other information, address

T. M. ALLEN, D.D.S., Dean,
Birmingham, Ala.

P. O. Box 718.

New York Dental School.

AN INSTITUTION OF THE

University of the State of New York.

CO-EDUCATIONAL.

Member of the National Association of Dental Faculties.

The Session of 1899–1900 begins October 5.

(*LAST DAY OF MATRICULATION OCTOBER 15.*)

New and Commodious quarters in the heart of the City, with superior Infirmary facilities for practice.

This College, denominated School, under the present laws of the State of New York, and coming under the head of Professional and Technical Schools, was incorporated in June, 1892. It has now reached its seventh annual course. The gradual growth from its beginning has been the history of all new organizations of its kind, and during the last two and present years stands upon a substantial foundation, comprising all the necessary implements and paraphernalia for the teaching of dentistry, but at the same time giving the *dental student* a *medical* training except in the strictly dental branches.

It is conceded by all attendants and graduates of the New York Dental School that the theoretical lectures, which are exceedingly practical, are unsurpassed in this country and perhaps unequaled.

With regard to INFIRMARY we strive to meet the demands of both student and State in supplying just enough material for the wants of the students and not to pauperize the public by making what is usually called a clinic.

The Diploma given by the New York Dental School is issued by the University of the State at Albany, only by permission of the New York Dental School to the State Board of Regents, which is the University of the State of New York.

For catalogue and further information, address

CHAS. MILTON FORD, M.D., Dean,
218 W. 135th St., New York City.

Washington Dental College

AND

HOSPITAL OF ORAL SURGERY.

Session of 1899-1900.

No. 625 MASSACHUSETTS AVENUE, NORTHWEST,

Washington, D. C.

FACULTY.

W. WARRINGTON EVANS, M.D., D.D.S., President, Professor of Oral Prosthesis.
AUG. WILSON SWEENY, D.D.S., Professor of Operative Dentistry.
JESSE RAMSBURGH, A.M., M.D., Professor of Oral Surgery.
D. ELMER WIBER, M.D., D.D.S., Professor of Histology and Pathology.
EDWIN R. HODGE, M.D., Professor of General and Dental Anatomy.
W. M. BARTON, M.D., Professor of Materia Medica and Anesthesia.
MONTE GRIFFITH, M.D., Professor of Physiology and Hygiene.
CHAS. E. FERGUSON, M.D., Professor of Chemistry and Metallurgy.
WM. N. COGAN, A.M., D.D.S., Professor of Dental Technics and Orthodontia.
F. M. NICHOLS, M.D., Professor of Bacteriology and Microscopy.
JOS. WALL, M.D., Demonstrator of Practical Anatomy.

With a select Board of Special Lecturers and Clinical Operators.

The regular session of this College will begin October 2, 1899, and terminate in May, 1900.

EDUCATIONAL CENTER AND LOCATION.

Washington as an educational center is becoming well known all over the world, being the Capital of a vast nation, centrally located, the great government wheel vibrating through the winter season, the headquarters of the Legations of all the foreign governments, etc., making it politically and socially, as well as educationally, the most attractive city in the world.

The Government Museums and Libraries are unrivaled. The Medical Museum and Library affords special advantages to the dental student found in no other city. It contains a dental department both in the Museum and Library, the latter possessing the largest and best collection of dental works in the world, while the Government permits the use of text books free of cost. The new Carnegie Free Library will be located within one square of this College. The College itself is central, yet quietly located. The three principal trunk lines of rapid transit street cars are all within two squares of the College, one line passing the door. The building is well adapted for its purpose; is new and modern throughout, with large laboratories for dental, chemical, microscopical, bacteriological, histological, and other work, together with large, well-lighted clinic and lecture rooms, and every other desired convenience. The Department of Oral Surgery will be a special feature, under the manipulative skill of the Oral Surgeon.

QUALIFICATIONS FOR ADMISSION.

This College conforms to the rules and conditions of the National Association of Dental Faculties, also the National Association of Dental Examiners.

PRIZES.—Three College Prizes are awarded each year for proficiency in practical work and studies to successful candidates.

FEES.—Tuition fee is $100 per year, with no extras.

The preliminary entrance examination will be held at the College Friday evening, September 29, 1899, at 7.30 o'clock.

Washington, owing to its numerous boarding houses and hotels, presents facilities for obtaining excellent board and room, varying in rate of charge from $3.00 per week upward.

Students should call upon the Secretary immediately upon arriving in the city.

For general announcement and further information please address

DR. W. W. EVANS, President, 1756 M Street, N. W.

DR. W. N. COGAN, Secretary, 1754 M Street, N. W.

Philadelphia Dental College and Hospital of Oral Surgery.

Has Removed to its New Building at

EIGHTEENTH AND BUTTONWOOD STREETS.

FACULTY.

S. H. GUILFORD, A.M., D.D.S., Ph.D., *Dean*, Professor of Operative and Prosthetic Dentistry, and Orthodontia.

S. B. HOWELL, A.M., M.D., D.D.S., Professor of Chemistry, Physics, and Metallurgy.

THOMAS C. STELLWAGEN, M.A., M.D., D.D.S., *Secretary*, Professor of Physiology.

L. GREENBAUM, M.D., D.D.S., Professor of Materia Medica, Anesthesia, and Odontotechny.

HENRY C. BOENNING, M.D., *Treasurer*, Professor of Anatomy and Surgery; Surgeon to the Oral Clinic.

ALTON H. THOMPSON, D.D.S., Professor of Dental Pathology, Therapeutics, and Comparative Dental Anatomy.

H. H. BOOM, M.D., Lecturer and Assistant to Chair of Chemistry.

INSTRUCTORS.

OTTO E. INGLIS, D.D.S., Demonstrator of Operative Dentistry and Dental Therapeutics.

J. W. MOFFITT, D.D.S., Demonstrator of Prosthetic Dentistry, Block and Continuous-Gum Work.

GEORGE A. MAGEE, D.D.S., Demonstrator of Operative Dentistry.

JOS. R. C. WARD, D.D.S., Demonstrator of Prosthetic Dentistry.

W. H. DOLMAN, D.D.S., Demonstrator of Prosthetic Dentistry, Crown- and Bridge-Work.

THOS. J. McLERNON, D.D.S., Demonstrator of Operative Dentistry.

ROBT. O. VAN DEUSEN, D.D.S., Assistant Demonstrator of Crown- and Bridge-Work.

GEO. S. SMOYER, D.D.S., Demonstrator of Operative Dentistry.

W. WALLACE FRITZ, M.D., Demonstrator of Anatomy.

H. AUGUSTUS BACON, M.D., Chief Assistant to Surgical Clinic; Demonstrator of Histology and Bacteriology.

T. C. STELLWAGEN, Jr., D.D.S., Assistant in Oral Surgical Clinic.

EDW. A. PENNINGTON, D.D.S., Assistant in Oral Surgical Clinic.

C. P. FRANKLIN, M.D., Assistant in Oral Surgical Clinic.

CHARLES F. WILBUR, D.D.S., Demonstrator of Dental Technics.

J. F. FLAIG, Assistant Demonstrator of Dental Technics.

CLINICAL INSTRUCTORS.

James McManus, D.D.S.
C. E. Francis, D.D.S.
H. C. Register, M.D., D.D.S.
F. D. Gardiner, D.D.S.
W. G. A. Bonwill, D.D.S.
Daniel N. McQuillen, D.D.S.
W. J. Magill, D.D.S.
R. L. Davis, D.D.S.
Joseph P. Wyman, D.D.S.
S. Eldred Gilbert, D.D.S.
S. B. Luckie, D.D.S.
Hayes A. Clement, D.D.S.
W. N. Daniels, D.D.S.
D. N. Merrill, D.D.S.
James R. F. Fitzpatrick, D.D.S.
Comly Shoemaker, Faculty Clerk.

The College Year begins with the Spring Session, May 7, which session continues until the middle of June. The Winter Course commences October 5, and closes early in the ensuing May. A preliminary Fall Course opens September 1.

The Dispensary and Laboratory are open all the year, except during July and August. Instruction in PRACTICAL DENTISTRY is a prominent feature of the institution. This work is under the supervision of an executive committee composed of the practicing dentists of the Faculty, the members of which, aided by competent Demonstrators, give special attention to the interests of students. The Dispensary consists of large, well-lighted rooms, furnished with comfortable operating-chairs, tables, and all conveniences, so that the opportunities here presented for acquiring a knowledge of clinical dentistry are ample and complete. The new laboratory is the largest of its kind in the country. A clinic in ORAL SURGERY is held every Saturday at 12 M.

Special clinics for the study and treatment of Diseases of the Teeth are held twice weekly by Profs. Stellwagen and Greenbaum, and on Crown- and Bridge-Work Wednesdays and Saturdays at 8 A.M. by Prof. Guilford.

Entrance.—Candidates who have a collegiate degree or who have passed the matriculate examination of a recognized dental school, or such as possess a certificate of one year's attendance in a High School, may enter without examination. All others must pass an equivalent examination in artihmetic, grammar, geography, history, and physics.

Examinations. FIRST YEAR.—Progress in Anatomy, Physiology, Materia Medica, Anesthesia, Histology, and Bacteriology. SECOND YEAR.—Progress in Chemistry, Prosthetic and Operative Dentistry, Pathology and Therapeutics, Anatomy, Physiology, Materia Medica, Anesthesia, Histology, and Bacteriology. THIRD YEAR.—Final in Chemistry, Prosthetic and Operative Dentistry, and Dental Pathology and Therapeutics.

Graduation.—Attendance on three courses of Lectures and satisfactory examinations in theory and practice are required for graduation. Graduates in medicine and pharmacy are eligible for graduation in Dentistry after attendance on Lectures and Clinical Service during two courses. These are excused from examination on subjects previously passed.

Graduation in Medicine.—Graduates in dentistry desiring to take the Medical degree continue their studies in a Medical College for two additional years.

Fees.—Tickets for each course, including the Demonstrator's, $100; Matriculation, inclusive of Syllabi for home study, $5 for each course; Examination and Diploma Fee, $35. Board $4 to $6 per week.

DR. S. H. GUILFORD, Dean of the Faculty, 1728 Chestnut St., Phila., Pa.

Date Due

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